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HUNTSVILLE, ALABAMA

Volume II

PREFERRED PARTS

MECHANICAL

MSFC-PPD-600

JULY 1, 1964

NASA

# Memorandum

DATE July 7, 1964

SUBJECT      George C. Marshall Space Flight Center (MSFC) Preferred Parts,  
MSFC-PPD-600

1. The subject document is the result of an MSFC coordinated effort to establish, as a basic element of MSFC's present and future parts program, a listing of preferred parts for use by design activities in selecting reliable parts for space vehicle systems application.
2. The document contains the best available information for the parts listed, but is by no means all inclusive. The PPD-600 is intended as a guide to the selection of parts for space systems applications and, as such, should be utilized to the maximum extent deemed practical.

3. Suggestions for improving the document are solicited. All recommended changes should be directed to the George C. Marshall Space Flight Center, Propulsion and Vehicle Engineering Laboratory, (R-P&VE-VNC), Huntsville, Alabama 35812, for approval and incorporation into this document.

**Hermann K. Weidner**

**All Holders of the MSFC Preferred  
Parts, MSFC-PPD-600**

## MSFC PREFERRED PARTS, MSFC- PPD-600, VOLUME II

### MECHANICAL

#### PREFACE

This document, prepared for use as a guide in selecting reliable parts for use in space vehicle systems, should be used as extensively as is practical. It is not the intent of this document to be used as the only source of data for part selection. This document is to be used on a day-by-day basis for part selection and as a primary source for the generation of the approved parts lists.

It is recognized that the parts listed will not completely satisfy all design requirements, because some items were omitted for various reasons. In many cases sufficient information was not available on parts of interest, but will be available for future revisions of this document.

The parts listed, when procured to the indicated specifications, are recommended for Flight and GSE except where noted.

- Note:
1. Temperature and strength ranges shown herein are established by either material manufacturers or previous operational experience. Critical and specific applications may require detailed analyses and qualification testing by design and materials personnel.
  2. Unless otherwise specified, the latest revision of applicable specifications and drawings shall be used.
  3. Unless otherwise noted, dimensions are given in inches.

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100° CSK Head, Tension Application, Pull Type  
100° CSK Head, Tension Application, Stump Type  
Protruding Head, Shear Application, Pull Type  
Protruding Head, Shear Application, Stump Type  
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Boss to Internal Thread, Internal Thread to Boss  
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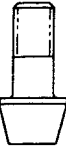
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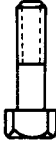
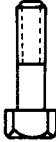


# BOLT

PART NUMBER	MATERIAL	SIZE RANGE	TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM	REMARKS	CONFIGURATION
NAS1586	CRES	1/4-28 1-1/4-12	+1200 -423	185		BOLT, 12 POINT 
MS21250	Steel	1/4-28 1-1/2-12	+450 -65	180		


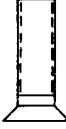

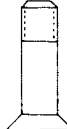

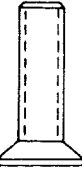

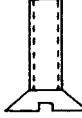
# BOLT

PART NUMBER	MATERIAL	SIZE RANGE	TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM	REMARKS	CONFIGURATION
NIS20004 thru NIS20024	Steel	1/4-28 1-1/2-12	+450 -65	160		BOLT, INTERNAL WRENCHING 

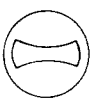


# BOLT

PART NUMBER	MATERIAL	SIZE RANGE	TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM	REMARKS	CONFIGURATION
NAS563 thru NAS572	Steel	#10-32 3/4-16	+450 -65	160		BOLT, HEX 
NAS1103 thru NAS1020	Steel	#10-32 1-1/4-12	+450 -65	160		BOLT, HEX 
NAS1003 thru NAS1020	CRES	#10-32 1-1/4-12	+1200 -423	140		
AN3 thru AN20	Steel	#10-32 1-1/4-12	+450 -65	125		
	Aluminum		+250 -65	62		
NAS1303 thru NAS1320	Steel	#10-32 1-1/4-12	+450 -65	160		
MS90727	Steel	1/4-28 1-1/2-12	+450 -65	150		
MS90728	Steel	1/4-20 2-1/2-4	+450 -65	150		

# SCREW

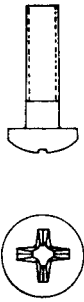
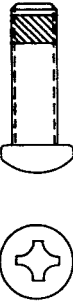

PART NUMBER	MATERIAL	SIZE RANGE	TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM	REMARKS	CONFIGURATION
MS24693	Steel	#4 - 40 3/8-24	+450 -65	55	Coarse threads in sizes #10-24 to 3/8-16 and fine threads in sizes #4-48 to #8-36 inactive for MSFC in-house design.	SCREW, 100° FLAT HEAD  
	CRES		+700 -100	55		
	Brass		—	55		
	Aluminum		+250 -423	62		
	Copper Silicon		—	—		
	Nickel Copper		—	—		
	Brass		—	—		
MC668	Brass		—	—	Part included for electrical equipment applications	
MS24694	Aluminum	#8-32 9/16-18	+250 -423	62	Part included for electrical equipment applications	SCREW, 100° FLAT HEAD  
MC669	CRES		—	—		
NAS1189	Steel	#2-56 3/8-24	+250 -65	160	Torque set recess inactive for MSFC in-house design.	SCREW, 100° FLAT HEAD, SELF-LOCKING  
	CRES		+250 -65	140		
NAS662	Steel	#0-80 #3-48	+450 -65	—	1 Self-Locking +250° 2 Self-Locking +250° -65° The slotted head design inactive for MSFC in-house design.	SCREW, 100° FLAT HEAD, PLAIN AND SELF-LOCKING  
	CRES		+700 -423			
	Brass		—			

# SCREW

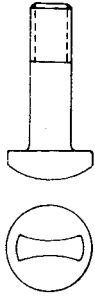
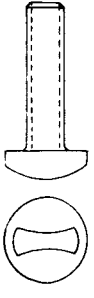
PART NUMBER	MATERIAL	SIZE RANGE	TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM	REMARKS	CONFIGURATION
NAS1219	Steel	#4-40 3/8-24	+450 -65	160	1 Cadmium plate. 2 Plain finish.	SCREW, 100° FLAT HEAD 
	CRES		+1200 -423	150		
	CRES		+700 -423	125		
	Steel		+450 -65	160		SCREW, 100° FLAT HEAD 
	CRES		+1200 -423	150		
	CRES		+700 -423	125		
NAS583 thru NAS590	Steel	#10-32 5/8-18	+450 -65	160		SCREW, 100° FLAT HEAD 



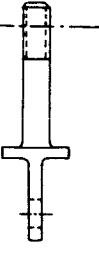
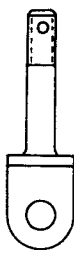
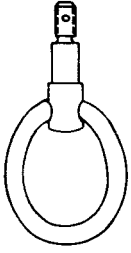

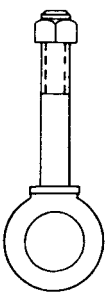

# SCREW

PART NUMBER	MATERIAL	SIZE RANGE	TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM	REMARKS	CONFIGURATION
MS35206	Steel	#2-56 3/8-16	+450 -65	55	Coarse threads in sizes #10-24 to 3/8-16 and fine threads in sizes #12-64 to #8-36 inactive for MSFC in-house design.  ▷ Part included for electrical equipment applications.	
MS35207		#2-64 3/8-24				
MS51957	CRES	#2-56 3/8-16	—			
MS51958		#2-64 3/8-24				
MS35214	Brass	#2-56 3/8-16	—			
MC670		#2-64 3/8-24				
MS35215						
MC671						
MS35218	Aluminum	#2-56 3/8-16	+250 -423	62		
MS35219		#2-64 3/8-24				
NAS1190	Steel	#2-56 3/8-24	+250 -65	160	Torque-set recess inactive for MSFC in-house design.	
	CRES		+250 -65	140		
NAS1301	Steel	#4-40 #10-32	+450 -65	55		
	CRES		+700 -320	70		
	Brass		—	—		


# SCREW

PART NUMBER	MATERIAL	SIZE RANGE	TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM	REMARKS	CONFIGURATION
NAS1216	Steel	#4-40 3/8-24	+450 -65	160	<div> <div>1</div> <div>2</div> </div> Gadmium plate. Plain finish.	SCREW, PAN HEAD 
	CRES		+1200 -423	150		
	CRES		+700 -423	125		
NAS1218	Steel		+450 -65	160		SCREW, PAN HEAD 
	CRES		+1200 -423	150		
	CRES		+700 -423	125		





# BOLT, SCREW

PART NUMBER	MATERIAL	SIZE RANGE	TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM	REMARKS	CONFIGURATION
AN42 thru AN49	Steel	#10-32 9/16-18	+450 -65	See Standard Sheet		<p>BOLT, EYE</p>  
NAS1251	Steel	5/16-24 3/4-16	+450 -65	See Standard Sheet		<p>BOLT, EYE, SWIVEL</p> 
NAS1053	Steel	1/4-20 1-1/2-6	+450 -65	See Standard Sheet		<p>BOLT, EYE, ASSEMBLY</p>  
MS35646	Carbon Steel or Brass	#000 # 14	—	—		<p>SCREW, EYE</p> 


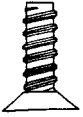


# SCREW

PART NUMBER	MATERIAL	SIZE RANGE	TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM	REMARKS	CONFIGURATION
MS21318	Steel	#00 #14	—	—		SCREW, DRIVE 


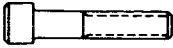
# SCREW

PART NUMBER	MATERIAL	SIZE RANGE	TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM	REMARKS	CONFIGURATION
MS 35492	Carbon Steel	#3 #16	—	—		  SCREW, WOOD
	Brass	#3 #14				
MS 35493	Carbon Steel	#2 #16	—	—		  SCREW, WOOD
	Brass	#2 #14				



# SCREW

PART NUMBER	MATERIAL	SIZE RANGE	TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM	REMARKS	CONFIGURATION
MS21207	Carbon Steel GRES	#4 1/4	—	—		  SCREW, SELF-TAPPING
AN530	Carbon Steel GRES	#2 1/4	—	—		  SCREW, SELF-TAPPING

# SCREW

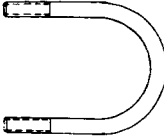
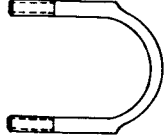
PART NUMBER	MATERIAL	SIZE RANGE	TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM	REMARKS	CONFIGURATION
NAS1351	Steel	#0-80 1-12	+450 -65 1	160	Sizes #1-72 to #8-36 inactive for MSFC in-house design.	SCREW, CAP, SOCKET HEAD  
	CRES		+700 -65 1 2	80	250° on self-locking design. 450° with Cadmium plate	
NAS1352	Steel	#1-64 1-1/2-6	+450 -65 1	160	Sizes #10-24 to 1-8 inactive for MSFC in-house design.	
	CRES		+700 -65 1 2	80	250° on self-locking design. 450° with cadmium plate	

# SCREW

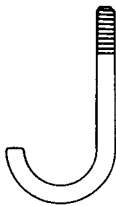
PART NUMBER	MATERIAL	SIZE RANGE	TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM	REMARKS	CONFIGURATION
NAS1081	Steel	#2-56 1/2-20	+250 -65	—		SCREW, SET, SELF-LOCKING 
	CRES					
AN565	Steel	#2-56 1/2-20	+450 -65	—	Fluted recess and oval point designs inactive for MSFC in-house design.	SCREW, SET 
	CRES		+600 -423			



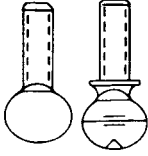
# BOLT

PART NUMBER	MATERIAL	SIZE RANGE	TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM ROOM TEMPERATURE	REMARKS	CONFIGURATION
MC658	1020 Steel	3/4 10-3/4	+450 -100	—		U-BOLT 
	316 CRES		+700 -423			
	6061 AL		+250 -423			
MC659	1020 Steel	3/4 10-3/4	+450 -100	—		U-BOLT, STRAP TYPE 
	316 CRES		+700 -423			
	6061 AL		+250 -423			

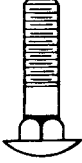
# BOLT

PART NUMBER	MATERIAL	SIZE RANGE	TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM ROOM TEMPERATURE	REMARKS	CONFIGURATION
NAS3203 thru NAS3210	Steel	#10-32 5/8-18	+450 -65	—		BOLT, HOOK 
	CRES		+600 -200			


# SCREW

PART NUMBER	MATERIAL	SIZE RANGE	TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM	REMARKS	CONFIGURATION
NAS1300	Steel and CRES	#6-32 1/2-20	—	—		SCREW, THUMB, PLAIN AND SHOULDERED 


# BOLT

PART NUMBER	MATERIAL	SIZE RANGE	TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM	REMARKS	CONFIGURATION
MS35751	Steel	#10-24 3/4-10	-	-		BOLT, CARRIAGE 

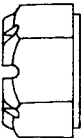


# BOLT

PART NUMBER	MATERIAL	SIZE RANGE	TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM	REMARKS	CONFIGURATION
MS16992	CRES Steel Silicon Bronze	1/4-3/4	—	—		BOLT, LAG 





# ROD

PART NUMBER	MATERIAL	SIZE RANGE	TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM ROOM TEMPERATURE	REMARKS	CONFIGURATION
MC135	304 CRES	#10-24 1-12	+700 -423	75		ROD, THREADED END 
	2024-T4 AL		+250 -423	62		
NAS183	2330 Steel	See Standard Sheet	+450 -100	125	For use in aluminum and magnesium parts only. Coarse threads on stud end. Gadmiium plate.	
NAS184					For use in steel or bronze. Fine threads on stud end. Gadmiium plate.	

# NUT


PART NUMBER	MATERIAL	SIZE RANGE	TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM	REMARKS	CONFIGURATION
AN310	Steel	#10-32 1-1/4-12	+450 -65	125		NUT, CASTELLATED 
	CRES		+700 -65	125		
	Aluminum		+250 -423	62		
MS35692	Steel	1/4 1-1/2	+450 -100	55	1 Cadmium or zinc plate. 2 Plain finish. 3 Phosphate coating.	NUT, SLOTTED 
			+700 -100			
			+200 -100			
	CRES		+600 -200	44		
	Brass		—	—		
AN320	Steel	#6-40 1-1/4-12	+450 -65	62	Sizes #6-40 and #8-36 inactive for MSFC in-house design.	NUT, SLOTTED, SHEAR 
	CRES		+700 -65	62		
	Aluminum		+250 -423	31		

# NUT

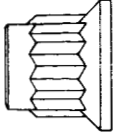
PART NUMBER	MATERIAL	SIZE RANGE	TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM	REMARKS	CONFIGURATION
NAS671	Steel	#0-80 #10-32	+450 -65	—		NUT, PLAIN, REDUCED HEX 
	CRES		+700 -65			
	Brass		—			
MS25082	Steel	#6 1	+450 -100	—		NUT, PLAIN, THIN 
	Brass		—			
MS35690	Steel	1/4 3	+450 -100	69	⚠ Cadmium or zinc plate. ⚠ Plain finish. ⚠ Phosphate coating.	NUT, PLAIN 
			+700 -100			
			+200 -100			
	CRES		+600 -200	55		
	Brass		—			
MS35691	Steel	1/4 3	+450 -100	31	⚠ Cadmium or zinc plate . ⚠ Plain finish. ⚠ Phosphate coating.	NUT, PLAIN 
			+700 -100			
			+200 -100			
	CRES		+600 -200	25		
	Brass		—			
MC664	Brass	#2 #10	—	—	Parts included for electrical equipment applications.	
MC665			—			



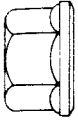
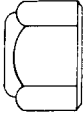




# NUT

PART NUMBER	MATERIAL	SIZE RANGE	TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM	REMARKS	CONFIGURATION
MS35425	Steel	#6-32 1/2-13	+450 -65	—		NUT, WING, PLAIN 
	Brass		—			
MS35426	Steel	#10-32 1/2-20	+450 -65	—		
	Brass		—			

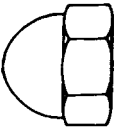
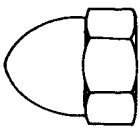
# NUT

PART NUMBER	MATERIAL	SIZE RANGE	TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM	REMARKS	CONFIGURATION
MC624	Steel	1/4-28 1-12	+450 -100	180		NUT, SELF-LOCKING 
MC625	GRES	#10-32 1-1/4-12	+1200 -423	185		
MC626	GRES	1/4-28 1-1/4-12	+1200 -423	185		


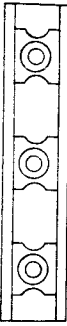
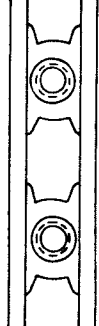
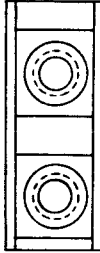

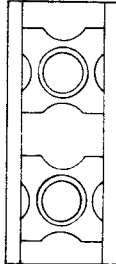
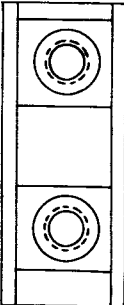
# NUT

PART NUMBER	MATERIAL	SIZE RANGE	TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM	REMARKS	CONFIGURATION
MS21042	Steel	#2-56 3/8-24	+450 -65	160		NUT, SELF-LOCKING 
MS21043	GRES	#4-40 3/8-24	+800 -423	125		
NAS1021	Steel	#4-40 1-1/4-12	+450 -65	125	<div> <div>1</div> <div>+250° with nylon insert.</div> </div> <div> <div>2</div> <div>-65° with nylon insert.</div> </div>	NUT, SELF-LOCKING 
	GRES		+700 -65	125		
	Aluminum		+250 -200	62		
	Copper Base		+250 -65	—		
NAS1022	Steel	#6-32 1-1/4-12	+450 -65	62		NUT, SHEAR, SELF-LOCKING 
	GRES		+700 -65	62		
	Aluminum		+250 -200	31		
	Copper Base		+250 -65	—		
MS20500	GRES	#10-32 1-14	+1200 -65	125		NUT, SELF-LOCKING 
MG667	Copper Base	#4-40 1-1/4-12	—	—	Parts included for electrical equipment applications.	NUT, SELF-LOCKING, THIN 
MG666		#6-32 1-1/4-12				
NAS679	Steel	#4-40 7/16-20	+450 -65	125		NUT, SELF-LOCKING, LIGHT WEIGHT 
	GRES		+550 -423			
	GRES		+800 -423			

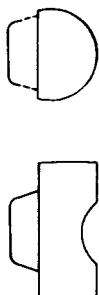
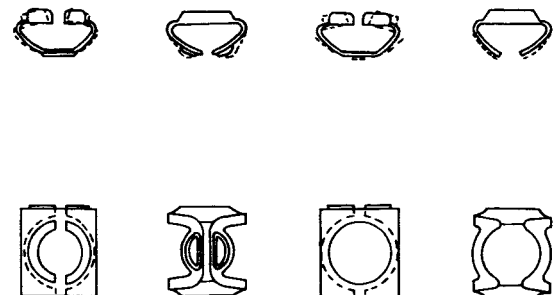
# NUT

PART NUMBER	MATERIAL	SIZE RANGE	TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM	REMARKS	CONFIGURATION
MS24679	Steel	#6 1-1/4	+450 -65	—		NUT, PLAIN, CAP, LOW CROWN 
	CRES		+600 -200			
	Brass		—			
MS24680	Steel	#6 1-1/4	+450 -65	—		NUT, PLAIN, CAP, HIGH CROWN 
	CRES		+600 -200			
	Brass		—			

# NUT



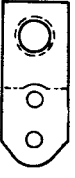
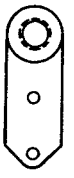


PART NUMBER	MATERIAL	SIZE RANGE	TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM	REMARKS	CONFIGURATION
NAS1034 thru NAS1038	Steel and CRES	#8-32 3/8-24	+450 -65	125	 -65° with nylon insert.	GANG CHANNEL, SELF-LOCKING 
	CRES		+700 -65			
	Steel and Aluminum		+250 -200			
	Aluminum		+250 -65			
NAS1512 thru NAS1513	Steel and Aluminum	#4-40 #6-32	+250 -65	125		GANG CHANNEL, SELF-LOCKING 
	Steel and CRES		+450 -65			
NAS688 thru NAS692	Steel and Aluminum	#8-32 3/8-24	+250 -65	125		GANG CHANNEL, SELF-LOCKING, LOW HEIGHT 
	Steel and CRES		+450 -65			
NAS1039 thru NAS1041	Steel and CRES	#8-32 1/4-28	+450 -65	125	 -65° with nylon insert.	GANG CHANNEL, SELF-LOCKING, COUNTERSUNK BASE 
	CRES		+700 -65			
	Steel and Aluminum		+250 -200			
	Aluminum		+250 -65			
NAS693 thru NAS695	Steel and Aluminum	#8-32 1/4-28	+250 -65	125		GANG CHANNEL, SELF-LOCKING, LOW HEIGHT, COUNTERSUNK BASE 
	Steel and CRES		+450 -65			

# NUT

PART NUMBER	MATERIAL	SIZE RANGE	TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM	REMARKS	CONFIGURATION
NAS577	Steel	1/4-28 1-1/2-12	+450 -65	180	See NAS578 for matching retainer.	<p>NUT, SELF-LOCKING, FLOATING BARREL</p> 
NAS578	Steel	1/4-28 1-1/2-12	+450 -65	—	See NAS577 for matching nut.	<p>RETAINER, FLOATING BARREL NUT</p> 




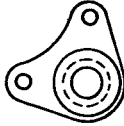

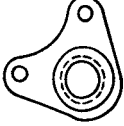

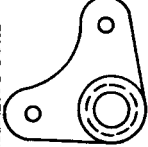

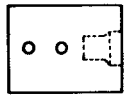
# PLATE NUT

PART NUMBER	MATERIAL	SIZE RANGE	TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM	REMARKS	CONFIGURATION
NAS1025	Steel	#6-32 3/8-24	+450 -65	125	① +250° with nylon insert.	PLATE NUT, SELF-LOCKING 
	CRES		+700 -65			
	Aluminum		+250 -65			
NAS1026	Steel	#6-32 3/8-24	+450 -65	125	① +250° with nylon insert.	PLATE NUT, SELF-LOCKING, COUNTERSUNK BASE 
	CRES		+700 -65			
	Aluminum		+250 -65			
NAS1032	Steel	#4-40 1/2-20	+450 -65	125	① All steel design.	PLATE NUT, SELF-LOCKING, FLOATING 
	CRES		+700 -65			
	Aluminum		+250 -65			
NAS696	Steel	#2-56 3/8-24	+450 -65	125	① +500° with dry film lubricant.	PLATE NUT, SELF-LOCKING, MINIATURE 
	CRES		+800 -423			
NAS1067	Steel	#8-32 3/8-24	+450 -65	125	① +500° with dry film lubricant.	PLATE NUT, SELF-LOCKING, MINIATURE 
	CRES		+800 -423			
BACN10MB ②	Steel	#10-32 3/8-24	+450 -65	125	Gross ref. two lug plain and floating options p. 52.01.09-1. ② The Boeing Co., part number.	PLATE NUT, SELF-LOCKING, FLOATING, CAPPED 

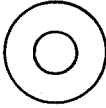






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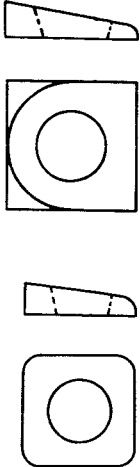
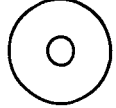
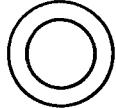
# PLATE NUT

PART NUMBER	MATERIAL	SIZE RANGE	TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM	REMARKS	CONFIGURATION
NAS1027	Steel	#4-40 5/8-18	+450 -65	125	1  +250° with nylon insert.	 PLATE NUT, SELF-LOCKING
	CRES		+700 -65			
	Aluminum		+250 -65			
NAS1028	Steel	#6-32 3/8-24	+450 -65	125	1  +250° with nylon insert.	 PLATE NUT, SELF-LOCKING, COUNTERSUNK BASE
	CRES		+800 -65			
	Aluminum		+250 -65			
NAS698	Steel	#2-56 3/8-24	+450 -65	125	1  +500° with dry film lubricant.	 PLATE NUT, SELF-LOCKING, MINIATURE
	CRES		+800 -423			
NAS1033	Steel	#6-32 5/16-24	+450 -65	125	1  All steel design.	 PLATE NUT, SELF-LOCKING, RIGHT ANGLE, FLOATING
	CRES		+700 -65			
	Aluminum		+250 -65			





# WASHER

PART NUMBER	MATERIAL	SIZE RANGE	REMARKS	CONFIGURATION
MS15795	Steel CRES Nickel-Copper Copper Brass Aluminum	#0 3		WASHER 
MS27183	Steel	#0 3		
AN960	Steel CRES Aluminum Brass	#2 2-1/2		WASHER 
MC661	Brass		Part included for electrical equipment applications.	
NAS1197	Aluminum	#2 1		
MS20002	Steel	1/4 1-1/2		WASHER, PLAIN AND COUNTERSUNK 
NAS1587	CRES	#10 1-1/4		
MC621	Steel	#10 1-1/2		
MS45901	Brass	#4 5/8		WASHER, ELECTRICAL 
NAS620	Steel Aluminum Brass	#0 1/4		WASHER, REDUCED O.D. 
NAS1515	See Standard Sheet	#2 3/8		WASHER, PLASTIC AND SYNTHETIC RUBBER 

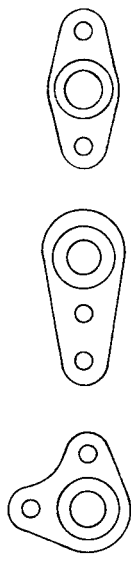
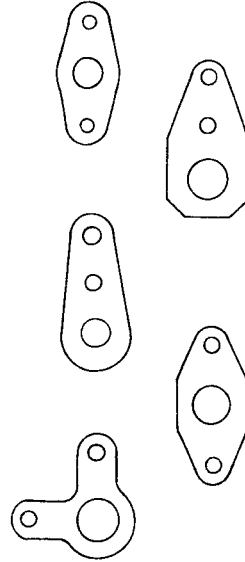
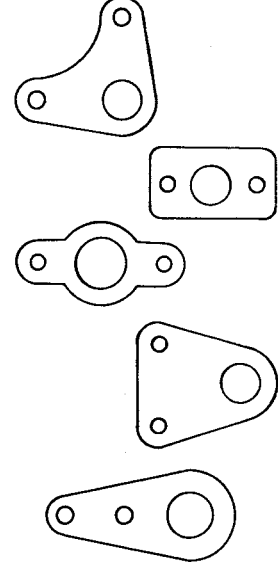
# WASHER

PART NUMBER	MATERIAL	SIZE RANGE	REMARKS	CONFIGURATION
NAS1099	Malleable Iron	1/4 1-1/8		WASHER, BEVEL, 9-1/2° 
AN970	Steel	#10 5/8		WASHER, FOR WOOD 
NAS549	Phenolic Fiber	#2 1		WASHER, PHENOLIC FIBER 

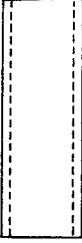

# WASHER

PART NUMBER	MATERIAL	SIZE RANGE	REMARKS	CONFIGURATION
MS35790	Steel Phosphor- Bronze	#6 3/8	Zinc plate inactive for MSFC in-house design.	WASHER, LOCK, 100° 
MS35335	Steel CRES Phosphor- Bronze	#4 1	Zinc plate inactive for MSFC in-house design.	WASHER, LOCK 
MC663	Phosphor- Bronze		Part included for electrical equipment applications.	
MS35333	Steel CRES Phosphor- Bronze	#2 1-1/4	Zinc plate inactive for MSFC in-house design.	WASHER, LOCK 
MC662	Phosphor- Bronze		Part included for electrical equipment applications.	
MS35338	Steel CRES Phosphor- Bronze Nickel- Copper	#2 1-1/2	Zinc plate inactive for MSFC in-house design.	WASHER, LOCK 

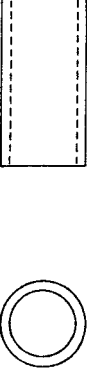
# SHIM

PART NUMBER	MATERIAL	SIZE RANGE	REMARKS	CONFIGURATION
NAS500	Steel CRES Aluminum	#8 1/4		SHIM, PLATE NUT, COUNTERSUNK 
NAS463	Steel CRES Aluminum	#4 9/16		SHIM, PLATE NUT, PLAIN 
NAS1195	Steel CRES Aluminum Titanium	#2 3/8		SHIM, PLATE NUT, MINIATURE 

# SPACER

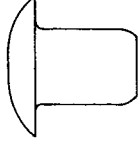
PART NUMBER	MATERIAL	TEMPERATURE RANGE °F	TENSILE STRENGTH KSI	REMARKS	CONFIGURATION
NAS42	2024-T3 AL	+250 -320	62		SPACER, RIVET  
	2024-T4 AL	+450 0			
	Steel	+600 -423			
NAS1056	303 Steel	+600 -423	—		
	A286 Steel	+1200 -423			
	Inconel "X" Nickel Base	+1200 -500			

# SPACER

PART NUMBER	MATERIAL	TEMPERATURE RANGE °F	TENSILE STRENGTH KSI	REMARKS	CONFIGURATION
NAS43	2024-T3 AL	+250 -320	62		SPACER, SCREW AND BOLT 
	2024-T4 AL	+450 0			
	Steel	+600 -423	125 to 145		
NAS1057	303 Steel	+600 -423	—		
	A286 Steel	+1200 -423			
	Inconel "X" Nickel Base	+1200 -423			

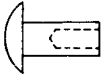
# RIVET

PART NUMBER	MATERIAL	SIZE RANGE		TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM ROOM TEMPERATURE	REMARKS	CONFIGURATION
		DIA	GRIP				
MS20470	2024-T4 AL	1/16 to 3/8	0.187 to 4.000	+250 -423	41 Shear		RIVET, SOLID
	1100 AL				11 Shear		
	2117-T4 AL			+250 -320	33 Shear		
	5056H32 AL				30 Shear		
	2017-T4 AL			+250 -100	39 Shear		
MS20613	1010 Carbon Steel	1/16 to 3/8	0.125 to 2.000	+450 + 32	25 Shear		
	302 CRES			+700 -423	65 Shear		
MS20615	Monel	See Standard Sheet	0.125 to 2.000	+1000(450) - 423	49 Shear	⚠ Cadmium plate monel rivet limited to +450°F.	
	Copper			+400 -423	22 Shear		
NAS1198	A286 CRES	1/16 to 1/4	0.125 to 2.000	+1200 -423	84 Shear		






# RIVET

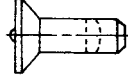
PART NUMBER	MATERIAL	SIZE RANGE		TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM ROOM TEMPERATURE	REMARKS	CONFIGURATION
		DIA	GRIP				
MS16535	1010 Carbon Steel	1/16 to 3/16	0.937 to 1.000	+450 + 32	25 Shear		RIVET, TUBULAR 
	Brass			+300 -423	31 Shear		
	2017 AL			+250 -100	26 Shear		
	Monel			+1000 -423	49 Shear		
	Copper			+400 -423	22 Shear		

# RIVET

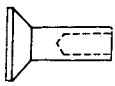
PART NUMBER	MATERIAL	SIZE RANGE		TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM ROOM TEMPERATURE	REMARKS	CONFIGURATION
		DIA	GRIP				
MS16535	1010 Carbon Steel	1/16 to 3/16	0.937 to 1.000	+450 + 32	25 Shear		RIVET, TUBULAR 
	Brass			+300 -423	31 Shear		
	2017 AL			+250 -100	26 Shear		
	Monel			+1000 -423	49 Shear		
	Copper			+400 -423	22 Shear		

# RIVET

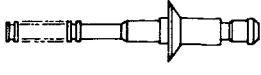
PART NUMBER	MATERIAL	SIZE RANGE		TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM ROOM TEMPERATURE	REMARKS	CONFIGURATION
		DIA	GRIP				
MS20426	2024-T4 AL	1/16 to 3/8	0.125 to 3.000	+250 -423	41 Shear		RIVET, SOLID, 100° COUNTERSUNK HEAD
	1100 AL			+250 -320	11 Shear		
	2117-T4 AL				33 Shear		
	5056H32 AL				30 Shear		
	2017-T4 AL			+250 -100	39 Shear		
MS20427	1012 Carbon Steel	1/16 to 3/8	0.125 to 3.000	+450 + 32	25 Shear		
	302, 304 CRES			+700 -423	65 Shear		
	Monel			+1000 -423	49 Shear		
	Copper			+400 -423	22 Shear		
	A286 CRES			+1200 -423	84 Shear		
NAS1199		1/16 to 1/4	0.125 to 2.000				



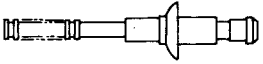
# RIVET

PART NUMBER	MATERIAL	SIZE RANGE		TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM ROOM TEMPERATURE	REMARKS	CONFIGURATION
		DIA	GRIP				
MS16536	1010 Carbon Steel	1/8 to 1/4	0.250 to 1.500	+450 + 32	25 Shear		RIVET, TUBULAR, 100° COUNTERSUNK HEAD 
	Brass			+300 -423	31 Shear		
	2017 AL			+250 -100	26 Shear		
	Monel			+1000 -423	49 Shear		
	Copper			+400 -423	22 Shear		

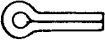
# RIVET, BLIND

PART NUMBER	MATERIAL	SIZE RANGE		TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM ROOM TEMPERATURE	REMARKS	CONFIGURATION
		DIA	GRIP				
MC612	5056 AL 2024 AL	1/8, 5/32, 3/16	0.020 to 0.535	+250 -320	32 Shear		RIVET, BLIND, 100° GSK HEAD, PULL TYPE, SELF- PLUGGING MECHANICAL LOCKED STEM 
	Monel 17-4PH CRES	1/8, 5/32, 3/16	0.032 to 0.438	+700 -200	49 Shear		
MC611	A286 CRES			+1200 -423	84 Shear		
	2017-T4, 5056H38, 7075 AL	1/8 to 1/4	0.063 to 0.875	+250 -100	38 Shear		
NAS1399	5056F, 5056H38, 7075 AL	1/8 to 1/4	0.063 to 0.875	+250 -320	32 Shear		
	Monel	1/8 to 1/4	0.063 to 0.875	+1000 -423	49 Shear		
	A286 CRES	1/8 to 1/4	0.063 to 0.875	+1200 -423	84 Shear		
	Monel						


# RIVET, BLIND

PART NUMBER	MATERIAL	SIZE RANGE		TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM ROOM TEMPERATURE	REMARKS	CONFIGURATION
		DIA	GRIP				
MC614	5056, 2024 AL	1/8, 5/32, 3/16	0.062 to 0.605	+250 to -320	32 Shear		RIVET, BLIND, UNIVERSAL HEAD, PULL TYPE, SELF-PLUGGING MECHANICAL LOCKED STEM 
MC613	Monel 17-4PH CRES	1/8, 5/32, 3/16	0.078 to 0.438	+700 to -200	49 Shear		
	A286 CRES			+1200 to -423	84 Shear		
NAS1398	2017-T4, 5056H38, 7075 AL	1/8 to 1/4	0.063 to 0.875	+250 to -100	38 Shear		
	5056F, 5056H38, 7075 AL		0.063 to 0.875	+250 to -320	32 Shear		
	Monel		0.063 to 0.875	+1000 to -423	49 Shear		
	A286 CRES		0.063 to 0.875	+1200 to -423	84 Shear		
	Monel						

# PIN, COTTER

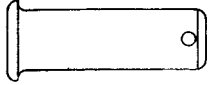
PART NUMBER	MATERIAL	SIZE RANGE		TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM ROOM TEMPERATURE	REMARKS	CONFIGURATION
		DIA	LENGTH				
MS24665	1010 Carbon Steel	1/32 to 3/8	1/4 to 6	+400 + 32	32 Shear		PIN, COTTER 
	301 CRES			+700 -423	65 Shear		
	Monel			+1000 -423	49 Shear		
	Brass			+300 -423	31 Shear		

# PIN, DOWEL

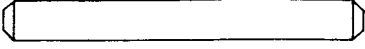
PART NUMBER	MATERIAL	SIZE RANGE		TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM ROOM TEMPERATURE	REMARKS	CONFIGURATION
		DIA	LENGTH				
AN122676 thru AN122775	AMS5132 Carbon Steel	1/6 to 1/2	1/4 to 2	+400 + 32	32 Shear	0.0002 oversize,  0.001 oversize.	PIN, DOWEL 
	Carbon Steel	1/16 to 1	3/16 to 6	+400 + 32	32 Shear		
MS16555	410 CRES			+1000 -100	100 Tensile		
MS16556	Carbon Steel	1/16 to 1	3/16 to 6	+400 + 32	32 Shear		




# PIN, FLAT HEAD

PART NUMBER	MATERIAL	SIZE RANGE		TEMPERATURE RANGE ° F	STRENGTH KSI MINIMUM ROOM TEMPERATURE	REMARKS	CONFIGURATION
		DIA	LENGTH				
MS20392	3140, 4130, 4037, 8630 Steel	1/8 to 1	25/64 to 4 11/16	+450 0	108 Tensile		PIN, FLAT HEAD 

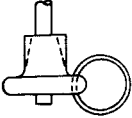
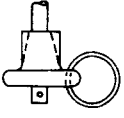
# PIN, HINGE

PART NUMBER	MATERIAL	SIZE RANGE		TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM ROOM TEMPERATURE	REMARKS	CONFIGURATION
		DIA	LENGTH				
MS20253	302, 304, 316 CRES	1/16 to 1/8	As reqd.	+700 -423	65 Shear	Cadmium plate for Aluminum hinge, passivated for CRES hinge.	PIN, HINGE 
	1010, 1020 Carbon Steel			+400 + 32	32 Shear		
MS27990	Brass			+300 -423	31 Shear		
	5052-0 AL	1/16 to 3/8	See Standard Sheet	+250 -320	9 Shear		
	302, 304, 305, 316 CRES			+700 -423	90 Tensile		
	Bronze			—	80 Tensile		


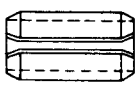

# PIN, LOCK

PART NUMBER	MATERIAL	SIZE RANGE		TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM ROOM TEMPERATURE	REMARKS	CONFIGURATION
		DIA	LENGTH				
MS9105	AMS5688	1/16 to 3/16	1/8 to 1-1/2	+700 -423	90 Tensile		PIN, LOCK 

# PIN

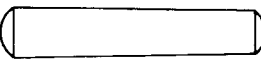
PART NUMBER	MATERIAL	SIZE RANGE		TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM ROOM TEMPERATURE	REMARKS	CONFIGURATION
		DIA	LENGTH				
NAS1333 thru NAS1346	Steel	3/16 to 1	See Standard Sheet	See Standard Sheet	See Standard Sheet		PIN, QUICK RELEASE, SINGLE ACTING 
	CRES						
	Aluminum						
NAS1353 thru NAS1366	Steel	3/16 to 1	See Standard Sheet	See Standard Sheet	See Standard Sheet		PIN, QUICK RELEASE, DOUBLE ACTING 
	CRES						
	Aluminum						

# PIN, SPRING


PART NUMBER	MATERIAL	SIZE RANGE		TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM ROOM TEMPERATURE	REMARKS	CONFIGURATION
		DIA	LENGTH				
NAS561	1070 Carbon Steel	1/16 to 1/2	3/16 to 4	+400 + 32	75 Tensile	Slotted and coiled.	PIN, SPRING 
	302 CRES			+700 -423	80 Tensile		
	410, 420 CRES			+1000 -100	80 Tensile		
MS16562	1070, 1095 Carbon Steel	1/16 to 1/2	3/16 to 3	+400 + 32	75 Tensile	Slotted.	
	410, 420 CRES			+1000 -100	80 Tensile		
MS51923	1070, 1095 Carbon Steel	1/32 to 1/2	1/8 to 2-1/4	+400 + 32	75 Tensile	Coiled.	
	302 CRES			+700 -423	80 Tensile		
	410, 414, 420 CRES			+1000 -100	80 Tensile		

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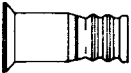
# PIN, TAPER

PART NUMBER	MATERIAL	SIZE RANGE		TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM ROOM TEMPERATURE	REMARKS	CONFIGURATION
		DIA	LENGTH				
MS24692	Carbon Steel	1/16 to 45/64	3/8 to 6	+400 + 32	40 Shear		PIN, TAPER 
	8740 Steel			+450 0	44 Shear		
	CRES			—	48 Shear		

# LOCKBOLT PIN


PART NUMBER	MATERIAL	SIZE RANGE		TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM ROOM TEMPERATURE	REMARKS	CONFIGURATION
		DIA	GRIP				
NAS1436 thru NAS 1442	4037 Steel	3/16 to 3/8	0.063 to 2.000	+450 0	95 Shear	0.0015 shank tolerance.	LOCKBOLT PIN, 100° CSK HEAD SHEAR APPLICATION, PULL TYPE 
	8740 Steel	1/8 to 3/4	0.630 to 1.500	+450 0	109 Shear		
	A286 CRES	1/8 to 3/8	0.063 to 1.125	+1200 -423	95 Shear		
MC642							

# LOCKBOLT PIN

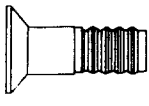
PART NUMBER	MATERIAL	SIZE RANGE		TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM ROOM TEMPERATURE	REMARKS	CONFIGURATION
		DIA	GRIP				
NAS1414 thru NAS1422	4037 Steel	1/8 to 3/8	0.062 to 2.000	+450 0	94 Shear	0.0015 shank tolerance.	LOCKBOLT PIN, 100° CSK HEAD SHEAR APPLICATION, STUMP (HAMMER DRIVE) TYPE 




# LOCKBOLT PIN

PART NUMBER	MATERIAL	SIZE RANGE		TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM ROOM TEMPERATURE	REMARKS	CONFIGURATION
		DIA	GRIP				
NAS1475 thru NAS1482	4037 Steel	5/32 to 3/8	0.095 to 2.031	+450 0	95 Shear		LOCKBOLT PIN, 100° CSK HEAD, TENSION APPLICATION, PULL TYPE  
NAS1456 thru NAS1462	4037 Steel	3/16 to 3/8	0.095 to 2.031	+450 0	95 Shear		
NAS1535 thru NAS1542	7075-T6 AL	5/32 to 3/8	0.095 to 2.031	+250 -320	46 Shear		
NAS1516 thru NAS1522	7075-T6 AL	3/16 to 3/8	0.095 to 2.031	+250 -320	46 Shear		
MC641	A-286 CRES	3/16 to 3/8	0.031 to 2.031	+1200 -423	95 Shear	0.0015 shank tolerance.	

# LOCKBOLT PIN

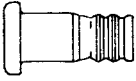
PART NUMBER	MATERIAL	SIZE RANGE		TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM ROOM TEMPERATURE	REMARKS	CONFIGURATION
		DIA	GRIP				
NAS1486 thru NAS1492	4037 Steel	3/16 to 3/8	0.095 to 2.031	+450 0	95 Shear	0.0015 shank tolerance.	LOCKBOLT PIN, 100° CSK HEAD, TENSION APPLICATION, STUMP (HAMMER DRIVE) TYPE 
NAS1546 thru NAS1552	7075-T6 AL	3/16 to 3/8	0.095 to 2.031	+250 -320	46 Shear	0.003 shank tolerance.	

# LOCKBOLT PIN


PART NUMBER	MATERIAL	SIZE RANGE		TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM ROOM TEMPERATURE	REMARKS	CONFIGURATION
		DIA	GRIP				
NAS1446 thru NAS1452	4037 Steel	3/16 to 3/8	0.062 to 2.000	+450 0	95 Shear	0.0015 shank tolerance.	LOCKBOLT PIN, PROTRUDING HEAD, SHEAR APPLICATION, PULL TYPE 
	8740 Steel	1/8 to 3/4	0.001 to 1.500	+450 0	109 Shear		
MC643	A286 CRES	1/8 to 3/8	0.063 to 1.125	+1200 -423	95 Shear		

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# LOCKBOLT PIN

PART NUMBER	MATERIAL	SIZE RANGE		TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM ROOM TEMPERATURE	REMARKS	CONFIGURATION
		DIA	GRIP				
NAS1424 thru NAS1432	4037 Steel	1/8 to 3/8	0.062 to 2.000	+450 0	95 Shear	0.0015 shank tolerance.	LOCKBOLT PIN, PROTRUDING HEAD, SHEAR APPLICATION, STUMP (HAMMER DRIVE) TYPE 

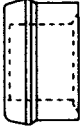
# LOCKBOLT PIN

PART NUMBER	MATERIAL	SIZE RANGE		TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM ROOM TEMPERATURE	REMARKS	CONFIGURATION
		DIA	GRIP				
NAS1465 thru NAS1472	4037 Steel	5/32 to 3/8	0.031 to 2.031	+450 0	95 Shear	0.0015 shank tolerance.	LOCKBOLT PIN, PROTRUDING HEAD, TENSION APPLICATION PULL TYPE 
NAS1525 thru NAS1532	7075-T6 AL	5/32 to 3/8	0.031 to 2.031	+250 -320	46 Shear		
MC640	A-286 CRES	3/16 to 3/8	0.031 to 2.031	+1200 -423	95 Shear	0.0015 shank tolerance.	

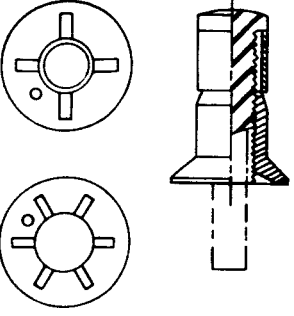
# LOCKBOLT PIN

PART NUMBER	MATERIAL	SIZE RANGE		TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM ROOM TEMPERATURE	REMARKS	CONFIGURATION
		DIA	GRIP				
NAS1496 thru NAS1502	4037 Steel	3/16 to 3/8	0.031 to 2.031	+450 0	95 Shear	0.0015 shank tolerance.	LOCKBOLT PIN, PROTRUDING HEAD, TENSION APPLICATION, STUMP (HAMMER DRIVE) TYPE 
NAS1556 thru NAS1562	7075-T6 AL	3/16 to 3/8	0.031 to 2.031	+250 -320	46 Shear	0.003 shank tolerance.	

# COLLAR, LOCKBOLT

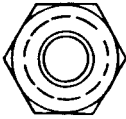
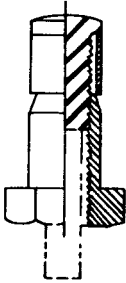
PART NUMBER	MATERIAL	SIZE RANGE		TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM ROOM TEMPERATURE	REMARKS	CONFIGURATION
		DIA	GRIP				
NAS1080	2024 AL	5/32 to 3/8	—	+250 -423	41 Shear		COLLAR, LOCKBOLT 
	6061 AL			+250 -320	30 Shear		
	Carbon Steel			+450 + 32	75 Tensile		

# FASTENER, BLIND




PART NUMBER	MATERIAL	SIZE RANGE		TEMP. RANGE °F	STRENGTH KSI MIN. ROOM TEMP.	REMARKS	CONFIGURATION
		DIA	GRIP				
NAS 1670	4130, 4140, 8740 STEEL 303, 304 CRES	.164 to .375	.094 to 2.031	0 +450	44 SHEAR		FASTENER, BLIND, FLUSH HEAD 
NAS 1672	A 286 CRES	.164 to .375	.094 to 2.031	+1200 -423	84 SHEAR		



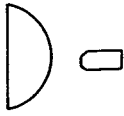
# FASTENER, BLIND

PART NUMBER	MATERIAL	SIZE RANGE		TEMP RANGE °F	STRENGTH KSI MIN. ROOM TEMP.	REMARKS	CONFIGURATION
		DIA.	GRIP				
NAS 1669	4130, 4140, 8740 STEEL 303, 304 CRES	.164 to .375	.031 to 2.031	0 +450	44 SHEAR		  <p>FASTENER, BLIND, PROTRUDING HEAD</p>
NAS 1671	A 286 CRES	.164 to .375	.031 to 2.031	+1200 -423	84 SHEAR		
NAS 1673	7075 AL 4130, 4140 Steel 303, 304 CRES	.164 to .260	.031 to 2.031	0 +250	32 SHEAR		


# KEY

PART NUMBER	MATERIAL	LENGTH RANGE	DIMENSION RANGE	SHEAR STRENGTH KSI	REMARKS	CONFIGURATION
NAS558	4130 Steel	3/4 to 3	1/8 to 1/2	125 to 150	Square and rectangular in cross-section.	SQUARE AND RECTANGULAR 
MS20065	Alloy Steel	1 to 5	5/16 to 9/16	90	Rectangular in cross-section.	
	Carbon Steel			60		
MS20066	Steel Grade A	1/4 to 12	1/16 to 1	75	Square in cross-section.	
	Steel Grade B			90		
	Steel Grade C			60		
MS20067	Steel Grade B	1/4 to 12	1/16 to 1	90	Square cross-section. One end square.	SQUARE 
	Steel Grade C			60		
MS20068	Steel Grade B	1/4 to 12	1/16 to 1	90	Square cross-section Both ends round.	
	Steel Grade C			60		


# KEY

PART NUMBER	MATERIAL	LENGTH RANGE	DIMENSION RANGE	SHEAR STRENGTH KSI	REMARKS	CONFIGURATION
MS21261	Steel	1/16 to 1-1/2	1/16 x 3/8 to 1/4 x 1-1/2	—	180 to 215 KSI tensile.	WOODRUFF, CHAMFERED 
MS35756	Steel	1/16 to 3-1/2	1/16 x 3/8 to 1/4 x 1-1/2	100		

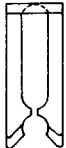
# SLIDE

PART NUMBER	MATERIAL	SIZE RANGE	TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM ROOM TEMPERATURE	REMARKS	CONFIGURATION
AN229	Brass Zinc	See Standard Sheet	—	—		ZIPPER 

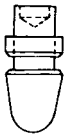
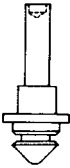


# STUD

PART NUMBER	MATERIAL	SIZE RANGE	TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM ROOM TEMPERATURE	REMARKS	CONFIGURATION
AN227	Metal	See Standard Sheet	—	—		STUD, SNAP AND CURTAIN 

# SLIDE

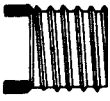
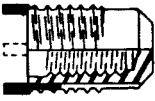
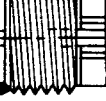



PART NUMBER	MATERIAL	SIZE RANGE	TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM ROOM TEMPERATURE	REMARKS	CONFIGURATION
AN3195	18-8 CRES	See Standard Sheet	+700 -423	80 Tensile		SNAPSLIDE 
	Phosphor Bronze		+225 -423	65 Tensile		

# STUD

PART NUMBER	MATERIAL	SIZE RANGE	TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM ROOM TEMPERATURE	REMARKS	CONFIGURATION
AN3196	303 CRES	See Standard Sheet	+700 -423	80 Tensile	Style I.	
	410 CRES		+1000 -100	—		
AN3197	Brass	See Standard Sheet	—	—	Style II.	
AN3198	303 CRES	See Standard Sheet	+700 -423	80 Tensile	Style III.	
	410 CRES		+1000 -100	—		
AN3199	303 CRES	See Standard Sheet	+700 -423	80 Tensile	Style IV.	
	410 CRES		+1000 -100	—		

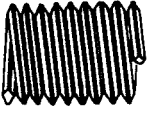

STUD, SNAPSLIDE

# INSERT


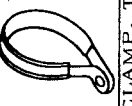
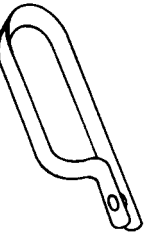
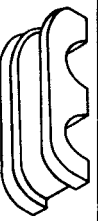

PART NUMBER	MATERIAL	SIZE RANGE	TEMPERATURE RANGE °F	FINISH	TENSILE STRENGTH	REMARKS	CONFIGURATION
NAS1394	Steel	8-32 x 1/4-20 to 1/2-20 x 5/8-11	+450 to 0	Cadmium plate	160 to 180	Light weight, free turning and self-locking.	INSERT, THREADED 
	303 CRES		+600 to -423	Passivate		▷ 600°F max when dry lube coated.	
	A286 CRES		+1200(600)▷ to -423				
NAS1395	Steel	4-40 x 12-24 to 5/8-18 x 7/8-14	+450 to 0	Cadmium plate	160 to 180	Heavy duty, free turning and self-locking.	INSERT, THREADED 
	303 CRES		+600 to -423	Passivate		▷ 600°F max when dry lube coated.	
	A286 CRES		+1200(600)▷ to -423				
MC630	303 CRES	8/32 x 1/4-20 to 1/2-20 x 5/8-11	+600 to -423	Passivate	160 to 180	Blind internal threads, light weight, free turning and self-locking.	INSERT, THREADED 
	A286 CRES		+1200(600)▷ to -423	Silver plate		▷ 600°F max when dry lube coated.	
	Steel		+450 to 0	Cadmium plate			
MC631	303 CRES	4-40 x 12-24 to 1-12 x 1-3/8 - 12	+600 to -423	Passivate	160 to 180	Blind internal threads, heavy duty, free turning and self-locking.	INSERT, THREADED 
	A286 CRES		+1200(600)▷ to -423	Silver plate		▷ 600°F max when dry lube coated.	
	Steel		+450 to 0	Cadmium plate			
MC632	303 CRES	2-56 x 1/4-28 to 8-32 x 3/8-24	+600 to -423	Passivate	160 to 180	Floating, free turning and self-locking.	INSERT, THREADED 
	Steel		+450 to 0	Cadmium plate			
	A286 CRES		+1200(600)▷ to -423				
MC633	303 CRES	5/16-18 to 1-3/8-12	+600 to -423	Passivate	160 to 180	Solid insert, use for hole plug, spring seat, striker plate, etc.	INSERT, THREADED 
	A286 CRES		+1200 to -423	Cadmium plate			
	Steel		+450 to 0				
MC634	17-4PH CRES	2-56 x 6-40 to 3/4-16 x 7/8-20	+600 to -110	Passivate	—	Thinwall, free turning or self-locking.	INSERT, THREADED 
	A286 CRES		+1200 to -423	Silver plate			
	Steel						



# INSERT

PART NUMBER	MATERIAL	SIZE RANGE	TEMPERATURE RANGE °F	FINISH	HEAT TREAT KSI	REMARKS	CONFIGURATION
MS21208	CRES	4-40 to 1-1/2-12 1, 1-1/2, 2 Dia in length	+600 -320	—	150 min	Requires special tap, use sleeve type if possible.	INSERT, THREADED 
MS21209	CRES	4-40 to 1-12 1-1/2, 2 Dia in length	+600 -320	—	150 min	Requires special tap, use sleeve type if possible.	INSERT, THREADED 

# CLAMP, TUBE AND WIRE BUNDLE SUPPORT





PART NUMBER	MATERIAL		SIZE RANGE	TEMPERATURE RANGE °F	FINISH	REMARKS	CONFIGURATION
MC635	Clamp	Cushion	3/16 to 4-1/8	+212 -40  +600 -120  +450 -320 +450 + 32 +450 -423	Carbon Steel Alloy Steel Cadmium plate	Any one of the three cushion materials is available on any of the clamp materials.  Temperature limits apply to cushion material.	CLAMP, TUBE AND WIRE BUNDLE SUPPORT 
	Alclad Carbon Steel Alloy Steel CRES	General Purpose Fuel Resistant					
		Hi-Temp					
		Teflon					
MC636	Carbon Steel CRES		1/8 to 2		Carbon Steel Cadmium plate	For use in LOX areas. Can be used in LOX tank.	CLAMP, TUBE AND WIRE BUNDLE SUPPORT 
MS9391	CRES		2 or 3 tubes 1/8 thru 3/8	+400 - 65	—	Use with MS9392 or MS9393.	CLAMP, TUBE AND WIRE BUNDLE SUPPORT 
MS9392	Synthetic Rubber		3 Tube	+400 - 65	—	Use with MS9391.	CUSHION, CLAMP, TUBE AND WIRE BUNDLE SUPPORT 
MS9393			2 Tube				
MS21919	Clamp	Cushion	1/8 to 4-1/8	+212 -320  +212 + 32 +450 + 32	Cadmium plate Limits Temp.	See cushion material.	CLAMP, TUBE AND WIRE BUNDLE SUPPORT 
	Alclad Aluminum	Fuel Resistant General Purpose					
	Low Carbon Steel	Fuel Resistant General Purpose					
		Hi-Temp					

# CLAMP, TUBE AND WIRE BUNDLE SUPPORT

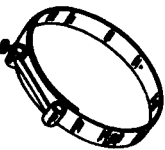



PART NUMBER	MATERIAL	SIZE RANGE	TEMPERATURE RANGE °F	FINISH	REMARKS	CONFIGURATION
AN735	Alclad	1/8 to 6	+450 0	—		CLAMP, TUBE AND WIRE BUNDLE SUPPORT 
	Carbon Steel Alloy Steel	1/8 to 3-1/2		Cadmium plate		
MS9025	321 CRES	1/8 to 2	+1200 -423	—	0.204 hole. 0.265 hole.	CLAMP, TUBE AND WIRE BUNDLE SUPPORT 
MS9353	Aluminum		+250 -320			
MS21315	Carbon Steel	1/8 to 2	+450 + 32	Cadmium plate		CLAMP, TUBE AND WIRE BUNDLE SUPPORT 
	Alclad		+250 -320	Anodized		
MS122900 thru MS122939	CRES	1/8 to 2	+1200 -320	—		CLAMP, TUBE AND WIRE BUNDLE SUPPORT 
MS25281	Nylon	1/8 to 2	+250 -100	—	180° maximum continuous available with or without wedge.	CLAMP, TUBE AND WIRE BUNDLE SUPPORT 

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# CLAMP, HOSE

PART NUMBER	MATERIAL	SIZE RANGE	TEMPERATURE RANGE °F	FINISH	REMARKS	CONFIGURATION
MS21920	Band-CRES	2-1/4 to 10	+450 -65	Passivate	Conventional and quick release.	CLAMP, HOSE 
	Nut and bolt Steel			Cadmium plate.		
AN737	CRES	7/16 to 3-9/16	 +450 -65		Radical or tangential machine screw, tangential worm screw.)  +600° if screw and nut are CRES.	CLAMP, HOSE 

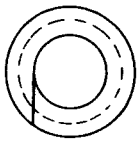
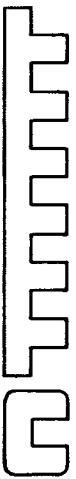
# CLAMP, HOSE

PART NUMBER	MATERIAL	SIZE RANGE	TEMPERATURE RANGE ° F	FINISH	REMARKS	CONFIGURATION
MS21920	Band-CRES	2-1/4 to 10	+450 -65	Passivate	Conventional and quick release.	CLAMP, HOSE 
	Nut and bolt Steel			Cadmium plate.		
AN737	CRES	7/16 to 3-9/16	+450 -65 		Radical or tangential machine screw, tangential worm screw.)  +600° if screw and nut are CRES.	CLAMP, HOSE 

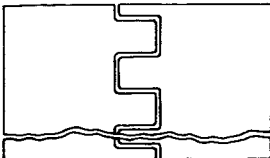
# GROMMET, METALLIC

PART NUMBER	MATERIAL	SIZE RANGE	TEMPERATURE RANGE °F	STRENGTH	REMARKS	CONFIGURATION
MS20230	Brass Aluminum	See Standard Sheet	—	—		GROMMET, METALLIC 

# GROMMET, NONMETALLIC

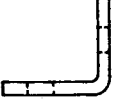

PART NUMBER	MATERIAL	SIZE RANGE	TEMPERATURE RANGE °F	STRENGTH	REMARKS	CONFIGURATION
MS35489	Rubber, Synthetic	1/8 to 2 ID	—	—		GROMMET, NONMETALLIC 
MS35490		1/8 to 1-1/2 ID				
MS21266	Nylon	015 to .320 Panel thickness	+85 -40	—	For large size and elongated holes.	GROMMET, NONMETALLIC 
	Teflon	Length cut at assembly	+400 -395			

# HINGE

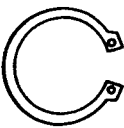

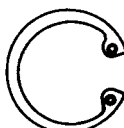
PART NUMBER	MATERIAL	SIZE RANGE	TEMPERATURE RANGE °F	REMARKS	CONFIGURATION
MS35822	Aluminum Brass Steel	1-1/16 to 2	Cadmium plate +450 to 0	Hinge, continuous.	<div>HINGE</div> 
MS20257	Aluminum	3/4 to 2	+250 to -320	Hinge, continuous.	
	CRES		+600 to -423		
MS20001	2024-T4 AL	—	+250 to -320	Hinge, structural, extruded.	



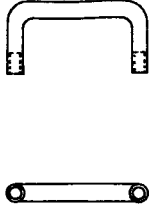
# BRACKET

PART NUMBER	MATERIAL	SIZE RANGE	DEGREES OF BEND	REMARKS	CONFIGURATION
MS9228	CRES	.5 x .5 1 x 2	—	90° Angle	BRACKET   
MC140	6061-T6 AL	—	0-135	Electrical connector.	
AN743	2024 AL	.5 to 1.5	—	Support clamp.	

# RING



PART NUMBER	MATERIAL	SIZE RANGE	SHEAR STRENGTH KSI	REMARKS	CONFIGURATION
MS16624	Carbon Steel	0.250 thru 10.000	Rings up to .75, 120	External, basic.	RING, RETAINING
	CRES	0.125 thru 0.256	Rings .75 & over, 150		
MS16628	Beryllium Copper	0.250 thru 1.500	Rings up to .75, 120	External, bowed.	
	Carbon Steel	0.250 thru 1.500	Rings .75 & over, 150		
	CRES	0.188 thru 0.236	110		
	Beryllium Copper	0.188 thru 0.236	110		
MS16630	Carbon Steel	1.00 thru 4.000	150	External, beveled.	
	CRES	1.00 thru 4.000	150		
MS16632	Carbon Steel	0.110 thru 1.375	Rings up to .75, 120	External, crescent.	RING, RETAINING
	CRES	0.110 thru 1.375	Rings .75 & over, 150		
MS16633	Carbon Steel	0.062 thru 1.375	Rings up to .140, 100	External, "E"	
	CRES	0.062 thru 1.375	Rings .140 to .375, 120		
	Beryllium Copper	0.040	Rings .375 & over, 150		
	Carbon Steel	0.125 thru 2.000	95		
MS16634	Carbon Steel	0.125 thru 2.000	Rings smaller than .25, 100	External, bowed, "E"	
	CRES	0.125 thru 2.000	Rings .25 to .375, 120		
MS16626	Carbon Steel	0.500 thru 3.938	150	External, inverted.	RING, RETAINING
	CRES	0.500 thru 3.938	150		
MS16625	Carbon Steel	0.250 thru 10.000	Rings up to .75, 120	Internal, basic.	RING, RETAINING
	CRES	0.250 thru 10.000	Rings .75 & over, 150		
MS16629	Carbon Steel	0.250 thru 1.500	Rings up to .75, 120	Internal, bowed.	
	CRES	0.250 thru 1.500	Rings .75 & over, 150		
MS16631	Carbon Steel	1.00 thru 6.000	150	Internal, beveled.	
	CRES	1.00 thru 6.000	150		
MS16627	Carbon Steel	0.750 thru 3.562	150	Internal, inverted.	RING, RETAINING
	CRES	0.750 thru 3.562	150		

# HANDLE

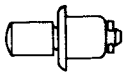



PART NUMBER	MATERIAL	SIZE RANGE	TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM	REMARKS	CONFIGURATION
MS39087	Brass	Lengths: 6.75 4.88 3.31	—	—	Part included for electrical equipment applications.	HANDLE, BOW 

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# HOOK, CHAIN







PART NUMBER	MATERIAL	TEMPERATURE RANGE °F	PULL STRENGTH LBS (MIN)	REMARKS	CONFIGURATION
MC220	CRES	+600 -65	115	Used for securing chain to dust cap.	HOOK, CHAIN, "S" 
	Brass	+375 -423	80		
NAS1090	CRES	+600 -65	75	Used with NAS1091 streamer.	HOOK, CHAIN, "S" 

# FASTENER, PUSH BUTTON



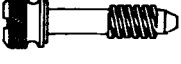

PART NUMBER	MFG CODE	MATERIAL	SIZE RANGE		TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM ROOM TEMPERATURE	REMARKS	CONFIGURATION
			SIZE	GRIP RANGE				
15S1	71286	Steel	—	.030 to .569	450	200 Lbs. Shear and Tensile	Part included for electrical equipment applications.	STUD ASSEMBLY 
15S11-1AC	71286	Steel	—	—	450	—	Part included for electrical equipment applications.	RETAINER 
15R1-1AC	71286	Steel	—	—	450	—	Part included for electrical equipment applications.	RECEPTACLE 
15R10-1AC	71286	Steel	—	—	450	—	Part included for electrical equipment applications.	NUT 

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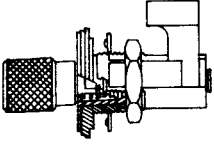
# FASTENER, QUARTER TURN

PART NUMBER	MFG CODE	MATERIAL	SIZE RANGE		TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM ROOM TEMPERATURE	REMARKS	CONFIGURATION
			SIZE	GRIP RANGE				
BACSZ1Y 	—		See Standard Sheet				Part included for electrical equipment applications.  The Boeing Co., part number.	STUD ASSEMBLY SEE STANDARD SHEET
BACW10X 	—		See Standard Sheet				Part included for electrical equipment applications.  The Boeing Co., part number.	RETAINING WASHER SEE STANDARD SHEET
BACR11Y 	—		See Standard Sheet				Camloc 2600 Series. Part included for electrical equipment applications.  The Boeing Co., part number.	RECEPTACLE SEE STANDARD SHEET

# FASTENER, CAPTIVE SCREW











PART NUMBER	MFG CODE	MATERIAL	SIZE RANGE		TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM ROOM TEMPERATURE	REMARKS	CONFIGURATION
			SIZE	GRIP RANGE				
12-13-404-11	94222	Carbon Steel	No. 2 	.150 to .500	—	—	Part included for electrical equipment applications.  1/4 Screw size.	FASTENER, CAPTIVE SCREW 
12-11014-11	94222	—	No. 2	—	—	—	Part included for electrical equipment applications.	FASTENER, RETAINING WASHER 

# FASTENER, PAWL LATCH

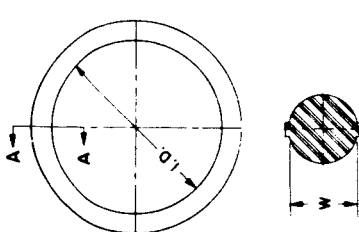
PART NUMBER	MFG CODE	MATERIAL	SIZE RANGE		TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM ROOM TEMPERATURE	REMARKS	CONFIGURATION
			SIZE	GRIP RANGE				
65L1	71286	Steel Aluminum	—	.040 to .740	—	—	Part included for electrical equipment applications.	FASTENER, PAWL LATCH 



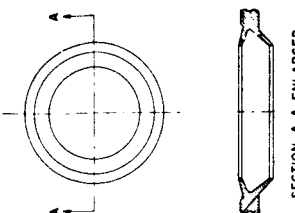
# PLUG, BUTTON

PART NUMBER	MATERIAL	SIZE RANGE	TEMPERATURE RANGE °F	STRENGTH KSI MINIMUM	REMARKS	CONFIGURATION
41V 	Steel (Zinc plate)		—	—	 Mfg code 71785 Part included for electrical equipment applications.  Use 1 inch size diameter for GSE in-house design.	PLUG, BUTTON, SCREEN TYPE  
BACP20B 	Steel Brass	125 to 2.500	—	—	Part included for electrical equipment applications.  The Boeing Co., part number	PLUG, BUTTON, PLAIN  

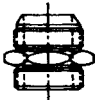

# O-RING, NONMETALLIC

PART NUMBER	MATERIAL	SIZE RANGE			TEMPERATURE RANGE °F	TENSILE STRENGTH PSI	PROCUREMENT SPEC	REMARKS	CONFIGURATION
		OD	ID	WIDTH					
AN6227	Synthetic Rubber	0.210 to 1.504 0.568 to 3.006 1.012 to 10.262 1.895 to 4.895 5.025 to 16.025	0.070 to 1.364 0.362 to 2.800 0.734 to 9.984 1.475 to 4.475 4.475 to 15.475	.070 .103 .139 .210 .275	+160 -65	Not specified	MIL-P-5516 Class B	General purpose petroleum. Hydraulic fluid resistant. MIL-H-5606, Dynamic Seal.	 SECTION A-A O-RING, NONMETALLIC
AN6230	Synthetic Rubber	1.887 to 4.887	1.609 to 4.609	.139	+160 -55	Not specified	MIL-P-5516 Class B	General purpose petroleum. Hydraulic fluid resistant. MIL-H-5506 static seal.	
MS9020	AMS7271 Synthetic Rubber	0.297 to 2.573	0.185 to 2.337	.056 to .118	+160 -55	1200	AMS7271	Low temp fuel resistant. Aromatics and aliphatics. Static Seal.	
MS9021	AMS7271 Synthetic Rubber	0.210 to 4.129 0.568 to 6.139 1.012 to 15.262 1.895 to 4.895 5.025 to 16.025	0.070 to 3.989 0.362 to 5.987 0.734 to 14.984 1.475 to 4.475 4.475 to 15.475	.070 .103 .139 .210 .275	+160 -65	1200	AMS7271	Low temp fuel resistant. Aromatics and aliphatics.	
MS28775	Synthetic Elastomer	0.109 to 1.504 0.568 to 3.006 1.012 to 4.887 1.892 to 4.895 5.025 to 16.025	0.029 to 1.364 0.362 to 2.800 0.734 to 4.609 1.475 to 4.475 4.475 to 15.475	.040 to .070 .103 .139 .210 .275	+275 -65	Not specified	MIL-P-25732	General purpose petroleum. Hydraulic fluid resistant. MIL-H-5606 275°F.	
MS28778	Synthetic Rubber	0.367 to 2.573	0.239 to 2.337	.064 to .118	+160 -65	Not specified	MIL-G-5510	General purpose air or hydraulic. Oil MIL-O-5606. Static seal.	
MS29512	Synthetic Rubber	0.367 to 2.573	0.239 to 2.337	.064 to .118	+160 -65	Not specified	MIL-P-5315	General purpose aircraft an- engine fuel systems. MIL-F-5616, MIL-F-5624, MIL-F-5572, static seal.	
MS29513	Synthetic Rubber	0.210 to 1.504 0.568 to 3.006 1.012 to 10.262 1.895 to 4.895 5.025 to 16.025	0.070 to 1.364 0.362 to 2.800 0.734 to 9.984 1.475 to 4.475 4.475 to 15.475	.070 .103 .139 .210 .275	+160 -65	Not specified	MIL-P-5315	General purpose aircraft and engine fuel systems. MIL-F-5616, MIL-F-5624, MIL-F-5572, dynamic seal.	
MS29561	Synthetic Rubber	0.210 to 1.504 0.568 to 3.006 1.012 to 10.262 1.895 to 4.895 5.025 to 16.025	0.070 to 1.364 0.362 to 2.800 0.734 to 9.984 1.475 to 4.475 4.475 to 15.475	.070 .103 .139 .210 .275	+275 -40	1200	MIL-R-7362 Type I Comp A	Diester synthetic engine oil and special purpose petroleum oil of similar characteristics. Dynamic seal.	


# SEAL, METALLIC

PART NUMBER	MATERIAL	TUBE SIZE	TEMPERATURE RANGE °F	BURST PRESSURE	CRITICAL OPERATING PRESSURE PSI	PROCUREMENT SPECIFICATION	REMARKS	CONFIGURATION
MC252	AMS5639	1/8 to 1	+250 -320	—	3000-Helium	—	Use in combination with MC178 end design, and MC240 boss design. Installation and torque requirements refer to MC245.	SEAL, METALLIC 
	A286 Solution Treated and Aged. Commercial AMS5735 Steel (Teflon coated)	1/8 to 1 1/2	+450 -423					

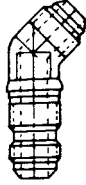

# ADAPTER, FLUID FITTING

PART NUMBER	MATERIAL	TUBE SIZE INCHES	TEMPERATURE RANGE °F	BURST PRESSURE AT ROOM TEMPERATURE PSI	CRITICAL OPERATING PRESSURE PSI	PROCUREMENT SPECIFICATION	REMARKS	CONFIGURATION
MC237	7075-T73 AL	1/8 to 1	+250 -320	12,000	3000-Helium	MSFC-SPEC-143	Use MC178 End Design in combination with: 1. Metallic boss seal and boss with MC240 design. See specific seal for limitations. 2. O-ring and boss with MC240 design. See specific seal for limitations.	BOSS TO TUBE 
	316 CRES		+700 -320				Use MC172 End Design in combination with: 1. MC125 sleeve, MC124 nut, and MSFC-SPEC-131 tubing or MIL-T-7081 tubing flared per MC146. 2. O-ring and boss with MC240 design. See specific seal for limitations.	
MF1815	7075-T73 AL	1/8 to 1	+250 -320	12,000	3000-Helium	MSFC-SPEC-143	Use MC178 End Design in combination with: 1. Metallic boss seal and boss with MC240 design. See specific seal for limitations. 2. O-ring and boss with MC240 design. See specific seal for limitations.	
	316 CRES		+700 -320				Use MC226 End Design in combination with: 1. MC125 sleeve, MF818 nut, and MSFC-SPEC-131 or MIL-T-7081 tubing flared per MC146. See MF818 for tubing wall thickness. 2. MF1818 nut and flexible hose with MC222 or MC223 design on mating ferrule.	

# ADAPTER, FLUID FITTING


PART NUMBER	MATERIAL	TUBE SIZE	TEMPERATURE RANGE ° F	BURST PRESSURE AT ROOM TEMPERATURE PSI	CRITICAL OPERATING PRESSURE PSI	PROCUREMENT SPECIFICATION	REMARKS	CONFIGURATION
MC236	7075-T73 AL	1/8 to 1	+250 -320	12,000	3000-Helium	MSFC-SPEC-143	<p>Use MC178 End Design in combination with:</p> <ol style="list-style-type: none"> <li>1. Metallic boss seal and boss with MC240 design. See specific seal for limitations.</li> <li>2. O-ring and boss with MC240 design. See specific seal for limitations.</li> </ol> <p>Use MC173 End Design in combination with MC174 nut, MC125 sleeve, MC124 nut, and MSFC-SPEC-131 tubing or MIL-T-7081 tubing flared per MC146.</p>	<p>BOSS TO BULKHEAD</p> 
	316 CRES		+700 -320					

# ELBOW, 45°, FLUID FITTING

PART NUMBER	MATERIAL	TUBE SIZE	TEMPERATURE RANGE °F	BURST PRESSURE AT ROOM TEMPERATURE PSI	CRITICAL OPERATING PRESSURE PSI	PROCUREMENT SPECIFICATION	REMARKS	CONFIGURATION
MC167	7075-T73 AL	1/8 to 1	+250 -320	12,000	3000-Helium	MSFC-SPEC-143	<p>Use MC173 End Design in combination with MC174 nut, MC125 sleeve, MC124 nut, and MSFC-SPEC-131 tubing or MIL-T-7081 tubing flared per MC146.</p> <p>Use MC172 End Design in combination with MC125 sleeve, MC124 nut, and MSFC-SPEC-131 tubing or MIL-T-7081 tubing flared per MC146.</p>	<p>BULKHEAD</p> 
	316 CRES		+700 -320					
MF1837	7075-T73 AL	1/8 to 1	+250 -320	12,000	3000-Helium	MSFC-SPEC-143	<p>Use MC227 End Design in combination with:</p> <ol style="list-style-type: none"> <li>MC221 nut, MC125 sleeve, MF818 nut, and MSFC-SPEC-131 or MIL-T-7081 tubing flared per MC146. See MF818 for tubing wall thickness.</li> <li>MC221 nut, MF1818 nut and flexible hose with MC222 or MC223 design on mating ferrule.</li> </ol> <p>Use MC226 End Design in combination with:</p> <ol style="list-style-type: none"> <li>MC125 sleeve, MF818 nut, and MSFC-SPEC-131 or MIL-T-7081 tubing flared per MC146. See MF818 for tubing wall thickness.</li> <li>MF818 nut and flexible hose with MC222 or MC223 design on mating ferrule.</li> </ol>	
	316 CRES		+700 -320					




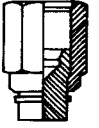
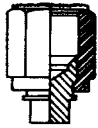
# BOLT, FLUID FITTING

PART NUMBER	MATERIAL	TUBE SIZE INCHES	TEMPERATURE RANGE °F	BURST PRESSURE AT ROOM TEMPERATURE PSI	CRITICAL OPERATING PRESSURE PSI	PROCUREMENT SPECIFICATION	REMARKS	CONFIGURATION
MC154	7075-T73 AL	1/4 to 1	+250 -320	—	—	MSFC-SPEC-143	Use MC172 End Design in combination with MC125 sleeve, MC124 nut, and MSFC-SPEC-131 tubing or MIL-T-7081 tubing flared per MC146.	FLUID FITTING-BOLT 
	316 CRES		+700 -320				Use in combination with MC155 elbow, two AN901 gaskets and boss with MC240 design. See specific gasket for limitations.	

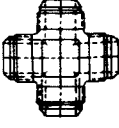
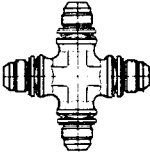
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# CAP, FLUID FITTING

PART NUMBER	MATERIAL	TUBE SIZE	TEMPERATURE RANGE °F	BURST PRESSURE AT ROOM TEMPERATURE PSI	CRITICAL OPERATING PRESSURE PSI	PROCUREMENT SPECIFICATION	REMARKS	CONFIGURATION
MC177	7075-T73 AL	1/8 to 1	+250 -320	16,000	3000-Helium	MSFC-SPEC-143	Use in combination with fitting using MC172 or MC173 end design.	CONICAL SEAT 
	316 CRES		+700 -320					
MC224	7075-T73 AL	1/8 to 1	+250 -320	—	3000-Helium	MSFC-SPEC-143	Use in combination with fitting using MC172 or MC173 end design.	TOROIDAL SEAT 
	316 CRES		+700 -320					
MF929	7075-T73 AL	1/8 to 1	+250 -320	—	3000-Helium	MSFC-SPEC-143	Use in combination with fitting using MC172 or MC173 end design.	
	316 CRES		+700 -320					

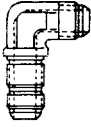
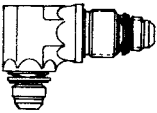
# CROSS, FLUID FITTING

PART NUMBER	MATERIAL	TUBE SIZE	TEMPERATURE RANGE °F	BURST PRESSURE AT ROOM TEMPERATURE PSI	CRITICAL OPERATING PRESSURE PSI	PROCUREMENT SPECIFICATION	REMARKS	CONFIGURATION
MC163	7075-T73 AL	1/8 to 1	+250 -320	12,000	3000-Helium	MSFC-SPEC-143	Use MC172 End Design in combination with: 1. MC125 sleeve, MC124 nut, and MSFC-SPEC-131 tubing or MIL-T-7081 tubing flared per MC146. 2. O-ring and boss with MC240 design. See specific seal for limitations.	FLARED TUBE 
	316 CRES		+700 -320					
MF827	7075-T73 AL	1/8 to 1	+250 -320	12,000	3000-Helium	MSFC-SPEC-143	Use MC226 End Design in combination with: 1. MC125 sleeve, MF818 nut, and MSFC-SPEC-131 or MIL-T-7081 tubing flared per MC146. See MF818 for tubing wall thickness. 2. MF1818 nut and flexible hose with MC222 or MC223 design on mating ferrule.	
	316 CRES		+700 -320					

# ELBOW, 45°, FLUID FITTING


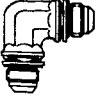
PART NUMBER	MATERIAL	TUBE SIZE	TEMPERATURE RANGE °F	BURST PRESSURE AT ROOM TEMPERATURE PSI	CRITICAL OPERATING PRESSURE PSI	PROCUREMENT SPECIFICATION	REMARKS	CONFIGURATION
MC249	7075-T73 AL	1/8 to 1	+250 -320	12,000	3000-Hydraulic Fluid	MSFC-SPEC-143	<p>Use MC211 End Design in combination with:</p> <ol style="list-style-type: none"> <li>1. AN924 nut, MC213 washer, O-ring and boss with MC240 design. See specific seal for limitations.</li> <li>2. MC175 nut, MS28777 ring, O-ring and boss with MC240 design. See specific seal for limitations.</li> </ol> <p>Use MC172 End Design in combination with MC125 sleeve, MC124 nut, and MSFC-SPEC-131 tubing or MIL-T-7081 tubing flared per MC146.</p>	<p>POSITIONING</p> 
	316 CRES		+700 -320					
MF837	7075-T73 AL	1/8 to 1	+250 -320	12,000	3000-Hydraulic Fluid	MSFC-SPEC-143	<p>Use MC211 End Design in combination with:</p> <ol style="list-style-type: none"> <li>1. AN924 nut, MC213 washer, O-ring and boss with MC240 design. See specific seal for limitations.</li> <li>2. MC175 nut, MS28777 ring, O-ring and boss with MC240 design. See specific seal for limitations.</li> </ol> <p>Use MC226 End Design in combination with:</p> <ol style="list-style-type: none"> <li>1. MC125 sleeve, MF818 nut, and MSFC-SPEC-131 or MIL-T-7081 tubing flared per MC146. See MF818 for tubing wall thickness.</li> <li>2. MF1818 nut and flexible hose with MC222 or MC223 design on mating ferrule.</li> </ol>	
	316 CRES		+700 -320					

# ELBOW, 90°, FLUID FITTING


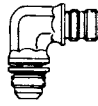
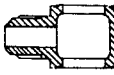
PART NUMBER	MATERIAL	TUBE SIZE	TEMPERATURE RANGE °F	BURST PRESSURE AT ROOM TEMPERATURE PSI	CRITICAL OPERATING PRESSURE PSI	PROCUREMENT SPECIFICATION	REMARKS	CONFIGURATION
MC165	7075-T73 AL	1/8 to 1	+250 -320	12,000	3000-Helium	MSFC-SPEC-143	Use MC173 End Design in combination with MC174 nut, MC125 sleeve, MC124 nut, and MSFC-SPEC-131 tubing or MIL-T-7081 tubing flared per MC146.	 BULKHEAD
	316 CRES		+700 -320				Use MC172 End Design in combination with MC125 sleeve, MC124 nut, and MSFC-SPEC-131 tubing or MIL-T-7081 tubing flared per MC146.	
MF1833	7075-T73 AL	1/8 to 1	+250 -320	12,000	3000-Helium	MSFC-SPEC-143	Use MC226 End Design in combination with: 1. MC125 sleeve, MF818 nut, and MSFC-SPEC-131 or MIL-T-7081 tubing flared per MC146. See MF818 for tubing wall thickness. 2. MF1818 nut and flexible hose with MC222 or MC223 design on mating ferrule.	
	316 CRES		+700 -320				Use MC227 End Design in combination with: 1. MC221 nut, MC125 sleeve, MF818 nut, and MSFC-SPEC-131 or MIL-T-7081 tubing flared per MC146. See MF818 for tubing wall thickness. 2. MC221 nut, MF1818 nut and flexible hose with MC222 or MC223 design on mating ferrule.	

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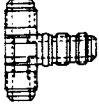
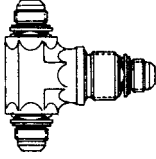
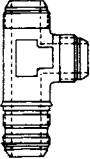
# ELBOW, 90°, FLUID FITTING

PART NUMBER	MATERIAL	TUBE SIZE	TEMPERATURE RANGE °F	BURST PRESSURE AT ROOM TEMPERATURE PSI	CRITICAL OPERATING PRESSURE PSI	PROCUREMENT SPECIFICATION	REMARKS	CONFIGURATION
MC161	7075-T73 AL	1/8 to 1	+250 -320	12,000	3000-Helium	MSFC-SPEC-143	Use MC172 End Design in combination with MC125 sleeve, MC124 nut, and MSFC-SPEC-131 tubing or MIL-T-7081 tubing flared per MC146.	NON-POSITIONING 
	316 CRES		+700 -320					
MF821	7075-T73 AL	1/8 to 1	+250 -320	12,000	3000-Helium	MSFC-SPEC-143	Use MC226 End Design in combination with: 1. MC125 sleeve, MF818 nut, and MSFC-SPEC-131 or MIL-T-7081 tubing flared per MC146. See MF818 for tubing wall thickness. 2. MF818 nut and flexible hose with MC222 or MC223 design on mating ferrule.	
	316 CRES		+700 -320					

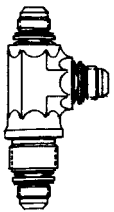
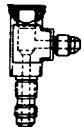
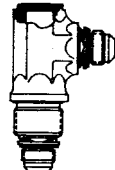
# ELBOW, 90°, FLUID FITTING

PART NUMBER	MATERIAL	TUBE SIZE	TEMPERATURE RANGE °F	BURST PRESSURE AT ROOM TEMPERATURE PSI	CRITICAL OPERATING PRESSURE PSI	PROCUREMENT SPECIFICATION	REMARKS	CONFIGURATION
MC248	7075-T73 AL	1/8 to 1	+250 -320	12,000	3000-Hydraulic Fluid	MSFC-SPEC-143	Use MC172 End Design in combination with MC125 sleeve, MC124 nut, and MSFC-SPEC-131 tubing or MIL-T-7081 tubing flared per MC146. Use MC211 End Design in combination with: 1. AN924 nut, MC213 washer, O-ring and boss with MC240 design. See specific seal for limitations. 2. MC175 nut, MS28777 ring, O-ring and boss with MC240 design. See specific seal for limitations.	POSITIONING 
	316 CRES		+700 -320					
MF833	7075-T73 AL	1/8 to 1	+250 -320	12,000	3000-Hydraulic Fluid	MSFC-SPEC-143	Use MC226 End Design in combination with: 1. MC125 sleeve, MF818 nut, and MSFC-SPEC-131 or MIL-T-7081 tubing flared per MC146. See MF818 for tubing wall thickness. 2. MF818 nut and flexible hose with MC222 or MC223 design on mating ferrule. Use MC211 End Design in combination with: 1. AN924 nut, MC213 washer, O-ring and boss with MC240 design. See specific seal for limitations. 2. MC175 nut, MS28777 ring, O-ring and boss with MC240 design. See specific seal for limitations.	
	316 CRES		+700 -320					
MC155	7075-T73 AL	1/4 to 1	+250 -320	—	—	MSFC-SPEC-143	Use MC172 End Design in combination with MC125 sleeve, MC124 nut, and MSFC-SPEC-131 tubing or MIL-T-7081 tubing flared per MC146. Use in combination with two AN901 gaskets and boss with MC240 design. See specific seal for limitations.	
	316 CRES		+700 -320					

# TEE, FLUID FITTING


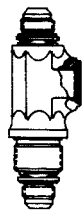
PART NUMBER	MATERIAL	TUBE SIZE	TEMPERATURE RANGE °F	BURST PRESSURE AT ROOM TEMPERATURE PSI	CRITICAL OPERATING PRESSURE PSI	PROCUREMENT SPECIFICATION	REMARKS	CONFIGURATION
MC166	7075-T73 AL	1/8 to 1	+250 -320	12,000	3000-Helium	MSFC-SPEC-143	Use MC172 End Design in combination with MC125 sleeve, MC124 nut, and MSFC-SPEC-131 tubing or MIL-T-7081 tubing flared per MC146.	 BULKHEAD
	316 CRES		+700 -320				Use MC173 End Design in combination with MC174 nut, MC125 sleeve, MC124 nut, and MSFC-SPEC-131 tubing or MIL-T-7081 tubing flared per MC146.	
MF1834	7075-T73 AL	1/8 to 1	+250 -320	12,000	3000-Helium	MSFC-SPEC-143	Use MC226 End Design in combination with: 1. MC125 sleeve, MF818 nut, and MSFC-SPEC-131 or MIL-T-7081 tubing flared per MC146. See MF818 for tubing wall thickness. 2. MF1818 nut and flexible hose with MC222 or MC223 design on mating ferrule.	
	316 CRES		+700 -320				Use MC227 Ergd Design in combination with: 1. MC221 nut, MC125 sleeve, MF818 nut, and MSFC-SPEC-131 or MIL-T-7081 109 tubing flared per MC146. See MF818 for tubing and wall thickness. 2. MC221 nut, MF1818 nut and flexible hose with MC222 or MC223 design on mating ferrule.	
MC158	7075-T73 AL	1/8 to 1	+250 -320	12,000	3000-Helium	MSFC-SPEC-143	Use MC172 End Design in combination with MC125 sleeve, MC124 nut, and MSFC-SPEC-131 tubing or MIL-T-7081 tubing flared per MC146.	
	316 CRES		+700 -320				Use MC173 End Design in combination with MC174 nut, MC125 sleeve, MC124 nut, and MSFC-SPEC-131 tubing or MIL-T-7081 tubing flared per MC146.	

# TEE, FLUID FITTING

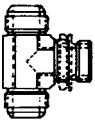
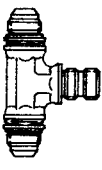
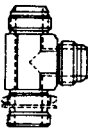
PART NUMBER	MATERIAL	TUBE SIZE	TEMPERATURE RANGE °F	BURST PRESSURE AT ROOM TEMPERATURE PSI	CRITICAL OPERATING PRESSURE PSI	PROCUREMENT SPECIFICATION	REMARKS	CONFIGURATION
MF1804	7075-T73 AL	1/8 to 1	+250 -320	12,000	3000-Helium	MSFC-SPEC-143	<p>Use MC227 End Design in combination with:</p> <ol style="list-style-type: none"> <li>MC221 nut, MF818 nut, and MSFC-SPEC-131 or MIL-T-7081 tubing flared per MC146. See MF818 for tubing wall thickness.</li> <li>MC221 nut, MF1818 nut and flexible hose with MC222 or MC223 design on mating ferrule.</li> </ol> <p>Use MC226 End Design in combination with:</p> <ol style="list-style-type: none"> <li>MC125 sleeve, MF818 nut, and MSFC-SPEC-131 or MIL-T-7081 tubing flared per MC146. See MF818 for tubing wall thickness.</li> <li>MF1818 nut and flexible hose with MC222 or MC223 design on mating ferrule.</li> </ol>	
	316 CRES		+700 -320					
MC157	7075-T73 AL	1/8 to 1	+250 -320	12,000	3000-Helium	MSFC-SPEC-143	<p>Use MC172 End Design in combination with MC125 sleeve, MC124 nut, and MSFC-SPEC-131 tubing or MIL-T-7081 tubing flared per MC146.</p> <p>Use MC173 End Design in combination with MC174 nut, MC125 sleeve, MC124 nut, and MSFC-SPEC-131 tubing or MIL-T-7081 tubing flared per MC146.</p>	
	316 CRES		+700 -320					
MF1784	7075-T73 AL	1/8 to 1	+250 -320	12,000	3000-Helium	MSFC-SPEC-143	<p>Use MC227 End Design in combination with:</p> <ol style="list-style-type: none"> <li>MC221 nut, MC125 sleeve, MF818 nut, and MSFC-SPEC-131 or MIL-T-7081 tubing flared per MC146. See MF818 for tubing wall thickness.</li> <li>MC221 nut, MF1818 nut and flexible hose with MC222 or MC223 design on mating ferrule.</li> </ol> <p>Use MC226 End Design in combination with:</p> <ol style="list-style-type: none"> <li>MC125 sleeve, MF818 nut, and MSFC-SPEC-131 or MIL-T-7081 tubing flared per MC146. See MF818 for tubing wall thickness.</li> <li>MF1818 nut and flexible hose with MC222 or MC223 design on mating ferrule.</li> </ol>	
	316 CRES		+700 -320					



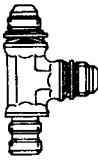
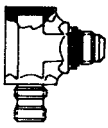
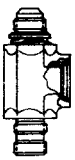
# TEE, FLUID FITTING

PART NUMBER	MATERIAL	TUBE SIZE	TEMPERATURE RANGE °F	BURST PRESSURE AT ROOM TEMPERATURE PSI	CRITICAL OPERATING PRESSURE PSI	PROCUREMENT SPECIFICATION	REMARKS	CONFIGURATION
MC156	7075-T73 AL	1/8 to 1	+250 -320	12,000	3000-Helium	MSFC-SPEC-143	Use MC172 End Design in combination with MC125 sleeve, MC124 nut, and MSFC-SPEC-131 tubing or MIL-T-7081 tubing flared per MC146.	BULKHEAD 
	316 CRES		+700 -320				Use MC173 End Design in combination with MC174 nut, MC125 sleeve, MC124 nut, and MSFC-SPEC-131 tubing or MIL-T-7081 tubing flared per MC146.	
MF1783	7075-T73 AL	1/8 to 1	+250 -320	12,000	3000-Helium	MSFC-SPEC-143	Use MC227 End Design in combination with: 1. MC221 nut, MC125 sleeve, MF818 nut, and MSFC-SPEC-131 or MIL-T-7081 tubing flared per MC146. See MF818 for tubing wall thickness. 2. MC221 nut, MF1818 nut and flexible hose with MC222 or MC223 design on mating ferrule.	
	316 CRES		+700 -320				Use MC226 End Design in combination with: 1. MC125 sleeve, MF818 nut, and MSFC-SPEC-131 or MIL-T-7081 tubing flared per MC146. See MF818 for tubing wall thickness. 2. MF1818 nut and flexible hose with MC222 or MC223 design on mating ferrule.	

# TEE, FLUID FITTING

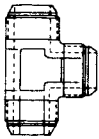
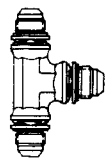
PART NUMBER	MATERIAL	TUBE SIZE	TEMPERATURE RANGE °F	BURST PRESSURE AT ROOM TEMPERATURE PSI	CRITICAL OPERATING PRESSURE PSI	PROCUREMENT SPECIFICATION	REMARKS	CONFIGURATION
MC251	7075-T73 AL	1/8 to 1	+250 -320	12,000	3000-Helium	MSFC-SPEC-143	Use MC172 End Design in combination with: 1. MC125 sleeve, MC124 nut, and MSFC-SPEC-131 tubing or MIL-T-7081 tubing flared per MC146. 2. O-ring and boss with MC240 design. See specific seal for limitations.	POSITIONING 
	316 CRES		+700 -320				Use MC211 End Design in combination with: 1. AN924 nut, MC213 washer, O-ring and boss with MC240 design. See specific seal for limitations. 2. MC175 nut, MS28777 ring, O-ring and boss with MC240 design. See specific seal for limitations.	
MF834	7075-T73 AL	1/8 to 1	+250 -320	—	—	MSFC-SPEC-143	Use MC226 End Design in combination with: 1. MC125 sleeve, MF818 nut, and MSFC-SPEC-131 or MIL-T-7081 tubing flared per MC146. See MF818 for tubing wall thickness. 2. MF1818 nut and flexible hose with MC222 or MC223 design on mating ferrule. Use MC211 End Design in combination with: 1. AN924 nut, MC213 washer, O-ring and boss with MC240 design. See specific seal for limitations. 2. MC175 nut, MS28777 ring, O-ring and boss with MC240 design. See specific seal for limitations.	
	316 CRES		+700 -320					
MC250	7075-T73 AL	1/8 to 1	+250 -320	—	—	MSFC-SPEC-143	Use MC211 End Design in combination with: 1. AN924 nut, MC213 washer, O-ring and boss with MC240 design. See specific seal for limitations. 2. MC175 nut, MS28777 ring, O-ring and boss with MC240 design. See specific seal for limitations. Use MC172 End Design in combination with: 1. MC125 sleeve, MC124 nut, and MSFC-SPEC-131 tubing or MIL-T-7081 tubing flared per MC146. 2. O-ring and boss with MC240 design. See specific seal for limitations.	
	316 CRES		+700 -320					

# TEE, FLUID FITTING

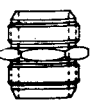

PART NUMBER	MATERIAL	TUBE SIZE	TEMPERATURE RANGE °F	BURST PRESSURE AT ROOM TEMPERATURE PSI	CRITICAL OPERATING PRESSURE PSI	PROCUREMENT SPECIFICATION	REMARKS	CONFIGURATION
MF804	7075-T73 AL	1/8 to 1	+250 -320	-	-	MSFC-SPEC-143	<p>Use MC211 End Design in combination with:</p> <ol style="list-style-type: none"> <li>1. AN924 nut, MC213 washer, O-ring and boss with MC240 design. See specific seal for limitations.</li> <li>2. MC175 nut, MS28777 ring, O-ring and boss with MC240 design. See specific seal for limitations.</li> </ol> <p>Use MC226 End Design in combination with:</p> <ol style="list-style-type: none"> <li>1. MC125 sleeve, MF818 nut, and MSFC-SPEC-131 or MIL-T-7081 tubing flared per MC146. See MF818 for tubing wall thickness.</li> <li>2. MF1818 nut and flexible hose with MC222 or MC223 design on mating ferrule.</li> </ol>	
	316 CRES		+700 -320					
MF784	7075-T73 AL	1/8 to 1	+250 -320	-	-	MSFC-SPEC-143	<p>Use MC211 End Design in combination with:</p> <ol style="list-style-type: none"> <li>1. AN924 nut, MC213 washer, O-ring and boss with MC240 design. See specific seal for limitations.</li> <li>2. MC175 nut, MS28777 ring, O-ring and boss with MC240 design. See specific seal for limitations.</li> </ol> <p>Use MC226 End Design in combination with:</p> <ol style="list-style-type: none"> <li>1. MC125 sleeve, MF818 nut, and MSFC-SPEC-131 or MIL-T-7081 tubing flared per MC146. See MF818 for tubing wall thickness.</li> <li>2. MF818 nut and flexible hose with MC222 or MC223 design on mating ferrule.</li> </ol>	
	316 CRES		+700 -320					
MF783	7075-T73 AL	1/8 to 1	+250 -320	-	-	MSFC-SPEC-143	<p>Use MC221 End Design in combination with:</p> <ol style="list-style-type: none"> <li>1. AN924 nut, MC213 washer, O-ring and boss with MC240 design. See specific seal for limitations.</li> <li>2. MC175 nut, MS28777 ring, O-ring and boss with MC240 design. See specific seal for limitations.</li> </ol> <p>Use MC226 End Design in combination with:</p> <ol style="list-style-type: none"> <li>1. MC125 sleeve, MF818 nut, and MSFC-SPEC-131 or MIL-T-7081 tubing flared per MC146. See MF818 for tubing wall thickness.</li> <li>2. MF1818 nut and flexible hose with MC222 or MC223 design on mating ferrule.</li> </ol>	
	316 CRES		+700 -320					

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# TEE, FLUID FITTING

PART NUMBER	MATERIAL	TUBE SIZE	TEMPERATURE RANGE °F	BURST PRESSURE AT ROOM TEMPERATURE PSI	CRITICAL OPERATING PRESSURE PSI	PROCUREMENT SPECIFICATION	REMARKS	CONFIGURATION
MC162	7075-T73 AL	1/8 to 1	+250 -320	12,000	3000-Helium	MSFC-SPEC-143	Use MC172 End Design in combination with MC125 sleeve, MC124 nut, and MSFC-SPEC-131 tubing or MIL-T-7081 tubing flared per MC146.	NON-POSITIONING 
	316 CRES		+700 -320					
MF824	7075-T73 AL	1/8 to 1	+250 -320	12,000	3000-Helium	MSFC-SPEC-143	Use MC226 End Design in combination with: 1. MC125 sleeve, MF818 nut, and MSFC-SPEC-131 or MIL-T-7081 tubing flared per MC146. See MF818 for tubing wall thickness. 2. MF1818 nut and flexible hose with MC222 or MC223 design on mating ferrule.	
	316 CRES		+700 -320					


# UNION, FLUID FITTING

PART NUMBER	MATERIAL	TUBE SIZE	TEMPERATURE RANGE °F	BURST PRESSURE AT ROOM TEMPERATURE PSI	CRITICAL OPERATING PRESSURE PSI	PROCUREMENT SPECIFICATION	REMARKS	CONFIGURATION
MC160	7075-T73 AL	1/8 to 1	+250 -320	12,000	3000-Helium	MSFC-SPEC-143	Use MC172 End Design in combination with: 1. MC125 sleeve, MC124 nut, and MSFC-SPEC-131 tubing or MIL-T-7081 tubing flared per MC146. 2. O-ring and boss with MC240 design. See specific seal for limitations.	TUBE 
	316 CRES		+700 -320					
MF815	7075-T73 AL	1/8 to 1	+250 -320	12,000	3000-Helium	MSFC-SPEC-143	Use MC226 End Design in combination with: 1. MC125 sleeve, MF818 nut, and MSFC-SPEC-131 or MIL-T-7081 tubing flared per MC146. See MF818 for tubing wall thickness. 2. MF1818 nut and flexible hose with MC222 or MC223 design on mating ferrule.	
	316 CRES		+700 -320					

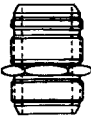

# UNION, FLUID FITTING

PART NUMBER	MATERIAL	TUBE SIZE	TEMPERATURE RANGE °F	BURST PRESSURE AT ROOM TEMPERATURE PSI	CRITICAL OPERATING PRESSURE PSI	PROCUREMENT SPECIFICATION	REMARKS	CONFIGURATION
MC243	7075-T73 AL	1/8 to 1	+250 -320	12,000	3000-Helium	MSFC-SPEC-143	Use MC178 End Design in combination with: 1. Metallic boss seal and boss with MC240 design. See specific seal for limitations. 2. O-ring and boss with MC240 design. See specific seal for limitations.	BOSS 
	316 CRES		+700 -320					

# UNION, FLUID FITTING

PART NUMBER	MATERIAL	TUBE SIZE	TEMPERATURE RANGE °F	BURST PRESSURE AT ROOM TEMPERATURE PSI	CRITICAL OPERATING PRESSURE PSI	PROCUREMENT SPECIFICATION	REMARKS	CONFIGURATION
MC573	7075-T73 AL	3/16 to 1	+250 -320	12,000	3000-Helium	MSFC-SPEC-143	Use in combination with: 1. Fitting with MC178 end design and O-ring or metallic boss seal. See specific seal for limitations. 2. Fitting end with MC211 end design, AN924 nut, MC213 washer, and O-ring. See specific seal for limitations. 3. Fitting with MC211 end design, MC175 nut, MS28777 ring, and O-ring. See specific seal for limitations.	INTERNAL THREAD 
	316 CRES		+700 -320					



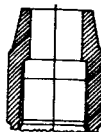
# UNION, FLUID FITTING

PART NUMBER	MATERIAL	TUBE SIZE	TEMPERATURE RANGE °F	BURST PRESSURE AT ROOM TEMPERATURE PSI	CRITICAL OPERATING PRESSURE PSI	PROCUREMENT SPECIFICATION	REMARKS	CONFIGURATION
MC164	7075-T73 AL	1/8 to 1	+250 -320	12,000	3000-Helium	MSFC-SPEC-143	<p>Use MC172 End Design in combination with MC125 sleeve, MC124 nut, and MSFC-SPEC-131 tubing or MIL-T-7081 tubing flared per MC146.</p> <p>Use MC173 End Design in combination with MC174 nut, MC125 sleeve, MC124 nut, and MSFC-SPEC-131 tubing or MIL-T-7081 tubing flared per MC146.</p>	<p>BULKHEAD</p> 
	316 CRES		+700 -320					
MF832	7075-T73 AL	1/8 to 1	+250 -320	12,000	3000-Helium	MSFC-SPEC-143	<p>Use MC227 End Design in combination with:</p> <ol style="list-style-type: none"> <li>MC221 nut, MC125 sleeve, MF818 nut, and MSFC-SPEC-131 or MIL-T-7081 tubing flared per MC146. See MF818 for tubing wall thickness.</li> <li>MC221 nut, MF1818 nut and flexible hose with MC222 or MC223 design on mating ferrule.</li> </ol> <p>Use MC226 End Design in combination with:</p> <ol style="list-style-type: none"> <li>MC125 sleeve, MF818 nut, and MSFC-SPEC-131 or MIL-T-7081 tubing flared per MC146. See MF818 for tubing wall thickness.</li> <li>MF818 nut and flexible hose with MC222 or MC223 design on mating ferrule.</li> </ol>	
	316 CRES		+700 -320					

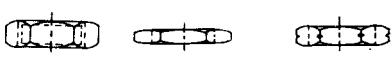
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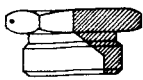
# NUTS, FLUID FITTING

PART NUMBER	MATERIAL	TUBE SIZE	TEMPERATURE RANGE °F	BURST PRESSURE AT ROOM TEMPERATURE PSI	CRITICAL OPERATING PRESSURE PSI	PROCUREMENT SPECIFICATION	REMARKS	CONFIGURATION	
MC124	7075-T73 AL	1/8 to 3	+250 -320	—	—	MSFC-SPEC-143	Refer to MC245 for torque requirements.	COUPLING 	
	316 CRES		+700 -320						
MF818	7075-T73 AL	1/8 to 1	+250 -320	—	—	MSFC-SPEC-143	Refer to MC245 for torque requirements.		
	316 CRES		+700 -320						
MF1818	7075-T73 AL	1/4 to 1	+250 -320	—	—	MSFC-SPEC-143	Refer to MC245 for torque requirements.		
	316 CRES		+700 -320						

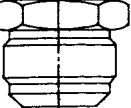
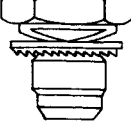
# NUTS, FLUID FITTING

PART NUMBER	MATERIAL	TUBE SIZE	TEMPERATURE RANGE °F	BURST PRESSURE AT ROOM TEMPERATURE PSI	CRITICAL OPERATING PRESSURE PSI	PROCUREMENT SPECIFICATION	REMARKS	CONFIGURATION
MC174	7075-T73 AL	1/8 to 3	+250 -320	—	—	MSFC-SPEC-143	Refer to MC245 for torque requirements.	UNIVERSAL AND BULKHEAD POSITIONING 
	316 CRES		+700 -320					
MC221	7075-T73 AL	1/8 to 2	+250 -320	—	MSFC-SPEC-143	Refer to MC245 for torque requirements.		
	316 CRES		+700 -320					
MC175	7075-T73 AL	1/8 to 2	+250 -320	—	MSFC-SPEC-143	Refer to MC245 for torque and lubrication requirements.		
	316 CRES		+700 -320					

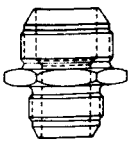
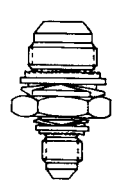
# PLUG, FLUID FITTING

PART NUMBER	MATERIAL	TUBE SIZE	TEMPERATURE RANGE °F	BURST PRESSURE AT ROOM TEMPERATURE PSI	CRITICAL OPERATING PRESSURE PSI	PROCUREMENT SPECIFICATION	REMARKS	CONFIGURATION
MC238	7075-T73 AL	1/8 to 2	+250 -320	12,000	3000-Helium	MSFC-SPEC-143	Use MC178 End Design in combination with: 1. Metallic boss seal and boss with MC240 design. See specific seal for limitations. 2. O-ring and boss with MC240 design. See specific seal for limitations.	BOSS 
	316 CRES		+700 -320					


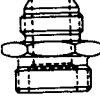
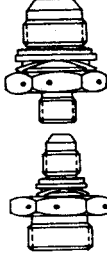
# PLUG, FLUID FITTING

PART NUMBER	MATERIAL	TUBE SIZE	TEMPERATURE RANGE °F	BURST PRESSURE AT ROOM TEMPERATURE PSI	CRITICAL OPERATING PRESSURE PSI	PROCUREMENT SPECIFICATION	REMARKS	CONFIGURATION
MC159	7075-T73 AL	1/8 to 1	+250 -320	12,000	3000-Helium	MSFC-SPEC-143	Use MC172 End Design in combination with: 1. MC125 sleeve, MC124 nut, and MSFC-Spec-131 tubing or MIL-T-7081 tubing flared per MC146. 2. O-ring and boss with MC240 design. See specific seal for limitation.	FLARED TUBE  
	316 CRES		+700 -320					
MF806	7075-T73 AL	1/8 to 1	+250 -320	12,000	3000-Helium	MSFC-SPEC-143	Use MC226 End Design in combination with: 1. MC125 sleeve, MF818 nut, and MSFC-SPEC-131 or MIL-T-7081 tubing flared per MC146. See MF818 for tubing wall thickness. 2. MF1818 nut and flexible hose with MC222 or MC223 design on mating ferrule.	
	316 CRES		+700 -320					

# REDUCER, FLUID FITTING


PART NUMBER	MATERIAL	TUBE SIZE	TEMPERATURE RANGE °F	BURST PRESSURE AT ROOM TEMPERATURE PSI	CRITICAL OPERATING PRESSURE PSI	PROCUREMENT SPECIFICATION	REMARKS	CONFIGURATION
MC169	7075-T73 AL	Large end 3/16 to 1 and Small end 1/8 to 1-1/4	+250 -320	12,000	3000-Helium	MSFC-SPEC-143	Use MC172 End Design in combination with: 1. MC125 sleeve, MC124 nut, and MSFC-SPEC-131 tubing or MIL-T-7081 tubing flared per MC146. 2. O-ring and boss with MC240 design. See specific seal for limitations.	TUBE TO TUBE 
	316 CRES		+700 -320					
MF919	7075-T73 AL	Large end to 1-1/2 and Small end to 1-1/4	+250 -320	12,000	3000-Helium	MSFC-SPEC-143	Use MC226 End Design in combination with: 1. MC125 sleeve, MF818 nut, and MSFC-SPEC-131 or MIL-T-7081 tubing flared per MC146. See MF818 for tubing wall thickness. 2. MF1818 nut and flexible hose with MC222 or MC223 design on mating ferrule.	
	316 CRES		+700 -320					

# REDUCER, FLUID FITTING

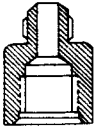

PART NUMBER	MATERIAL	TUBE SIZE	TEMPERATURE RANGE °F	BURST PRESSURE AT ROOM TEMPERATURE PSI	CRITICAL OPERATING PRESSURE PSI	PROCUREMENT SPECIFICATION	REMARKS	CONFIGURATION
MC235	7075-T73 AL	MC172 end 3/16 to 1-1/2 and MC178 end 1/8 to 1-1/4	+250 -320	12,000	3000-Helium	MSFC-SPEC-143	Use MC178 End Design in combination with: 1. Metallic boss seal and boss with MC240 design. See specific seal for limitations. 2. O-ring and boss with MC240 design. See specific seal for limitations.	
	316 CRES		+700 -320				Use MC172 End Design in combination with: 1. MC125 sleeve, MC124 nut, and MSFC-SPEC-131 tubing or MIL-T-7081 tubing flared per MC146. 2. O-ring and boss with MC240 design. See specific seal for limitations.	
MC242	7075-T73 AL	MC172 end 1/8 to 1-1/4 and MC178 end 3/16 to 1-1/2	+250 -320	12,000	3000-Helium	MSFC-SPEC-143	Use MC178 End Design in combination with: 1. Metallic boss seal and boss with MC240 design. See specific seal for limitations. 2. O-ring and boss with MC240 design. See specific seal for limitations.	
	316 CRES		+700 -320				Use MC172 End Design in combination with: 1. MC125 sleeve, MC124 nut, and MSFC-SPEC-131 tubing or MIL-T-7081 tubing flared per MC146. 2. O-ring and boss with MC240 design. See specific seal for limitations.	
MF1919	7075-T73 AL	MC266 end 1/8 to 1 and MC178 end 3/16 to 1-1/2	+250 -320	12,000	3000-Helium	MSFC-SPEC-143	Use MC226 End Design in combination with: 1. MC125 sleeve, MF818 nut, and MSFC-SPEC-131 or MIL-T-7081 tubing flared per MC146. See MF818 for tubing wall thickness. 2. MF1818 nut and flexible hose with MC222 or MC223 design on mating ferrule.	
	316 CRES		+700 -320				Use MC178 End Design in combination with: 1. Metallic boss seal and boss with MC240 design. See specific seal for limitations. 2. O-ring and boss with MC240 design. See specific seal for limitations.	

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# REDUCER, FLUID FITTING

PART NUMBER	MATERIAL	TUBE SIZE	TEMPERATURE RANGE °F	BURST PRESSURE AT ROOM TEMPERATURE PSI	CRITICAL OPERATING PRESSURE PSI	PROCUREMENT SPECIFICATION	REMARKS	CONFIGURATION
MC244	7075-T73 AL	Small end 1/8 to 1-1/4 and	+250 -320	12,000	3000-Helium	MSFC-SPEC-143	Use MC178 End Design in combination with: 1. Metallic boss seal and boss with MC240 design. See specific seal for limitations. 2. O-ring and boss with MC240 design. See specific seal for limitations.	BOSS TO BOSS 
	316 CRES	Large end 3/16 to 1-1/2	+700 -320					



# REDUCER, FLUID FITTING

PART NUMBER	MATERIAL	TUBE SIZE	TEMPERATURE RANGE °F	BURST PRESSURE AT ROOM TEMPERATURE PSI	CRITICAL OPERATING PRESSURE PSI	PROCUREMENT SPECIFICATION	REMARKS	CONFIGURATION
MC239	7075-T73 AL	MC240 end 3/16 to 1-1/4 and MC178 end 1/8 to 1	+250 -320	12,000	3000-Helium	MSFC-SPEC-143	Use MC172 End Design in combination with: 1. MC125 sleeve, MC124 nut, and MSFC-SPEC-131 tubing or MIL-T-7081 tubing flared per MC146. 2. O-ring and boss with MC240 design. See specific seal for limitations.	INTERNAL THREAD TO TUBE 
	316 CRES		+700 -320					
MF894	7075-T73 AL	MC226 end 1/8 to 1 and MC240 end 3/16 to 1-1/4	+250 -320	12,000	3000-Helium	MSFC-SPEC-143	Use MC226 End Design in combination with: 1. MC125 sleeve, MF818 nut, and MSFC-SPEC-131 or MIL-T-7081 tubing flared per MC146. See MF818 for tubing wall thickness. 2. MF1818 nut and flexible hose with MC222 or MC223 design on mating ferrule.	
	316 CRES		+700 -320					




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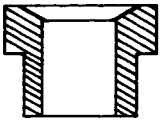
# REDUCER, FLUID FITTING

PART NUMBER	MATERIAL	TUBE SIZE	TEMPERATURE RANGE °F	BURST PRESSURE AT ROOM TEMPERATURE PSI	CRITICAL OPERATING PRESSURE PSI	PROCUREMENT SPECIFICATION	REMARKS	CONFIGURATION
MC234	7075-T73 AL	MC240 end 1/4 to 1 and MC178 end 5/16 to 1-1/4	+250 -320	12,000	3000-Helium	MSFC-SPEC-143	Use MC178 End Design in combination with: 1. Metallic boss seal and boss with MC240 design. See specific seal for limitations. 2. O-ring and boss with MC240 design. See specific seal for limitations.	BOSS TO INTERNAL THREAD, INTERNAL THREAD TO BOSS  
	316 CRES		+700 -320					
MC233	7075-T73 AL	MC240 end 3/16 to 1-1/4 and MC178 end 1/8 to 1	+250 -320	12,000	3000-Helium	MSFC-SPEC-143	Use MC178 End Design in combination with: 1. Metallic boss seal and boss with MC240 design. See specific seal for limitations. 2. O-ring and boss with MC240 design. See specific seal for limitations.	
	316 CRES		+700 -320					

# REDUCER, FLUID FITTING

PART NUMBER	MATERIAL	TUBE SIZE	TEMPERATURE RANGE °F	BURST PRESSURE AT ROOM TEMPERATURE PSI	CRITICAL OPERATING PRESSURE PSI	PROCUREMENT SPECIFICATION	REMARKS	CONFIGURATION
MC247	7075-T73 AL	MC223 end 1/4 to 1 and	+250 -320	—	—	MSFC-SPEC-143	<p>Use MC172 End Design in combination with MC125 sleeve, MC124 nut, and MSFC-SPEC-131 tubing or MIL-T-7081 tubing flared per MC146.</p> <p>Use MC223 End Design in combination with fitting using MC172 or MC173 end design.</p>	FITTING TO TUBE 
	316 CRES	MC172 end 1/8 to 3/4	+700 -320					

# SLEEVE, FLUID FITTING

PART NUMBER	MATERIAL	TUBE SIZE	TEMPERATURE RANGE °F	BURST PRESSURE AT ROOM TEMPERATURE PSI	CRITICAL OPERATING PRESSURE PSI	PROCUREMENT SPECIFICATION	REMARKS	CONFIGURATION
MC125	7075-T73-AL	1/8 to 1	+250 -320	—	—	MSFC-SPEC-143	To be used in combination with MC124 or MF818 coupling nut.	SLEEVE 
	AM355 CRES		+700 -320					